US Army Corps of Engineers®
Buffalo District

FUSRAP

Preliminary Assessment

Joslyn Manufacturing Site
Fort Wayne, Indiana

Prepared by:

U.S. Army Corps of Engineers, Buffalo District
23 August 2005

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Abbreviations, Acronyms, and Symbols

AEC	Atomic Energy Commission
ANL	Argonne National Lab
AR	Army Regulation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOE	Department of Energy
dpm	Disintegrations per minute
EDR	Environmental Data Resources
EPA	Environmental Protection Agency
FUSRAP	Formerly Utilized Sites Remedial Action Program
gpm	Gallons per minute
HASL	Health and Safety Laboratory (AEC)
MED	Manhattan Engineer District
MCL	Maximum Contaminant Level
MOU	Memorandum of Understanding
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
NRCS	National Resource Conservation Service
ORNL	Oak Ridge National Laboratory
PCOC	Potential Chemical of Concern
PA	Preliminary Assessment
pCi/g	Pico curies per gram
pCi/L	Picocuries per liter
RESRAD	Residual Radioactive Material at Remediation Sites
RSSI	Radiation Safety Services Inc.
SAIC	Science Applications International Corporation
U	Uranium
U of C	University of Chicago
USACE	United States Army Corps of Engineers
μR/h	microRoentgen per hour

1.0 INTRODUCTION

A Preliminary Assessment was performed, by the United States Army Corps of Engineers (USACE), of the Joslyn Manufacturing and Supply Co. following the process outlined in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Contingency Plan (NCP). The purpose of this assessment was to review information to determine the need for further action by USACE, under the Formerly Utilized Sites Remedial Action Program (FUSRAP), to ensure the protection of human health and the environment. The scope of the assessment included a review of existing information about the site and a site visit on 26 and 27 April 2005.

From 1944-1949, Joslyn Manufacturing and Supply Co., was engaged by the University of Chicago under contract 7401-37-9 to roll and machine uranium rods from billets. The uranium billets were received by rail. Small furnaces were used to heat the material. Three mills and straightening, threading, and grinding equipment were used in the operation. An outdoor area was allegedly used to burn waste.

In March of 1974, FUSRAP was begun under the direction of the Atomic Energy Commission (AEC) and in 1975 was assigned to the Energy and Research and Development Administration (ERDA) until the responsibility of FUSRAP was assigned to the newly created Department of Energy (DOE) in 1977. In the Energy and Water Development Appropriations Act, 1998, (Title I, Public Law 105-62, 111 Stat. 1320, 1326) Congress transferred the responsibility for the administration and execution of cleanup at eligible FUSRAP sites to USACE. In the Energy and Water Development Appropriations Act, 2000 (Title VI, Public Law 106-60, 113 Stat. 483, 502), Congress indicated that any response action taken under the FUSRAP program by the Secretary of the Army, acting through the Chief of Engineers, shall be subject to CERCLA and the NCP.

In March of 1999, USACE and DOE signed a Memorandum of Understanding (MOU) between the agencies for the purpose of delineating the administration and execution of responsibilities of each party for the FUSRAP program. Pursuant to that MOU, when a new site is considered for inclusion in the FUSRAP, DOE is responsible for performing historical research to determine if the site was used for activities that supported the Nation's early atomic energy program. If DOE concludes that the site was used for that purpose, the agency will provide USACE with that determination. USACE is then responsible for preparing a Preliminary Assessment (PA) in accordance with CERCLA and the NCP to determine if a response action is appropriate as a result of releases related to the nation’s early atomic energy program.

The purpose of a PA at potential FUSRAP sites is to determine if there is an unpermitted release or threat of release at the site, as those terms are defined in Section 101(22) of CERCLA, of an FUSRAP eligible hazardous substance that may present a threat to the public health or the environment. If a PA determines that there is a release or there is a threat of release, other than one that is federally permitted or addressed by a legally enforceable license, permit, regulation or order issued pursuant to the Atomic Energy Act of 1954 or other Federal statute, and it may present a threat to the public health or the environment, CERCLA authorizes further response actions to investigate the site as necessary. Appropriate actions might be removal (if imminent threat to the human health or environment), or additional investigation (Site Investigation) and potentially a Remedial Investigation/Feasibility Study, Proposed Plan and Record of Decision. If no such release or threat of release is found or no significant threat to the public health or environment is identified, the PA will recommend no further action.

On 26 August 2004, after performing historical research regarding the site, the DOE provided USACE with a determination that the site was used in activities that supported the Nation's early atomic energy program (Attachment A). Accordingly, the former Joslyn Manufacturing Site may be eligible for inclusion in the FUSRAP program if it is determined under section III.D.2 of the Memorandum of Understanding (MOU) between the DOE and USACE that further CERCLA response actions may be necessary to address FUSRAP-related contamination at the site.

In addition to the DOE historical records search, USACE contracted with Argonne National Labs (ANL) to perform an additional records search. ANL performed this search in April 2005 (Attachment H). Representatives from Argonne and USACE visited several locations including the National Archives and Records Administration, University of Chicago, Argonne National Labs-Central Library, and the Indiana Department of Transportation. ANL concluded that the USACE had all the available documents pertaining to uranium (U)-billet shaping activity at the Joslyn Manufacturing Site.

2.0 SITE DESCRIPTION, OPERATIONAL HISTORY AND WASTE CHARACTERISTICS

2.1 Site Description

The former Joslyn Manufacturing and Supply Co. is currently known as the Fort Wayne Steel Corporation (Fort Wayne Steel) and is located in Allen County, Indiana. The site is located in an industrial setting at 2302 Taylor St (Attachment B). A Norfolk & Southern Railroad to the north, Taylor St. to the south, a drainage ditch (Junk Ditch) to the west, and commercial properties to the east borders the site(s). There are also several residential, commercial, and industrial business areas within less than one mile from the site e.g. churches, schools, and commercial business. Located northeast of the site is Swinney Park, a recreational area for the local community.

2.2 Owner – Operator Information

The former Joslyn Manufacturing Site is broken into two distinct areas owned by Valbruna Slater Stainless Steel, Inc. (Valbruna) and Fort Wayne Steel, respectively. Fort Wayne Steel is a subsidiary of Valbruna Steel, which is located at 2400 Taylor St. and is separated by a chain link fence from Fort Wayne Steel. Valbruna specializes in the production of stainless steel and hot and cold finished bars. Valbruna owns the buildings that are west of building 10, which is approximately 40 acres in size while Fort Wayne owns the buildings east of and including building 9, which is approximately 23 acres in size. Attachment B depicts the general property lines of the site between Valbruna and Fort Wayne Stainless. Areas involved in U-billet shaping activities are designated by letters A-J on the attached plant layout in Attachment C. The focus of the Preliminary Assessment is the area now occupied by the Fort Wayne Steel Corporation, however further investigations may include surrounding areas if necessary.

2.3 Operational History and Waste Characteristics

For the purposes of this assessment, the operational history of the former Joslyn Manufacturing and Supply Co. began with the first service contract, Subcontract Number 7401-37-9 entered on 15 August 1943 with the University of Chicago (U of C). This contract was renewed annually until contract termination on June 30, 1946. Under this contract, Joslyn Manufacturing and Supply Co. performed tempering, hot rolling, quenching, straightening, cooling, grinding, abrasive cutting, waste burning and threading of natural uranium billets (U-billets) into metal rods. U-billets were received by rail, unloaded by an overhead crane onto carts and stored in a storage area until needed. U-billets were then taken to the

tempering area, heated with eight small electric furnaces, and moved to the rolling mills (an 18" roughing stand, 12" intermediate mill and a 9" finishing mill were used) and quenching areas. After quenching, the rods were cropped, moved to the threading area where the rods were milled and shaved to contract specifications (Attachment D). The grinding process was carried out in two widely separated parts of a large shed. The first operation consisted of grinding uranium rods. This process was carried on in a small shed constructed inside a larger shed. The fumes and dust from this smaller shed was vented into the atmosphere of the larger shed. The second operation was carried out was a rough cut on the uranium rods inside of the smaller shed. The existing documentation does not give dimensions of the shed sizes. Additionally the floors in the areas where uranium billets were processed were of various types of media that included brick, concrete, and dirt floors.

Additional documents indicate that the Joslyn Manufacturing and Supply Co. fabricated approximately 15 tons of uranium rods for the British and Canadian Governments beginning in August 1946. The extent to which this information affects FUSRAP responsibilities will be determined in the future by USACE. Documentation also exists that indicates that Joslyn Manufacturing and Supply Co. continued to roll uranium rods until at least 1949 under a University of Chicago contract. An office memorandum, from F.N. Malone to R.J. Smith, Chief, Miscellaneous Operations Area, Production Division New York Operations Office, Subject: Uranium Rod Requisition NAA-SF-11, confirms a conversation dated January 22, 1952 in which one 20' and three 10' rods each 13/16'' in diameter were to be shipped to the Joslyn Manufacturing and Supply Co. This memorandum provides documentation showing the latest point in time that uranium rod may have been rolled at the Joslyn Manufacturing site based on review of available documents.

The potential contaminants of concern (PCOC) with U-billet shaping processes performed at the Joslyn Manufacturing Site include uranium (U) and its associated daughter products. Even though it is understood that additional chemicals are needed to shape or machine billets into rods, there is no information in the documents reviewed under the document search (Attachment H) identifying other PCOC on the site.

2.4 Previous Radiological Surveys

Four radiological surveys presently exist of the former Joslyn Manufacturing Company Co. performed in 1949, 1976, 2004, and 2005 respectively. The 1949 survey was performed by A. R. Piccot of the AEC Health and Safety Laboratory (HASL) on 1 August 1949. The results of this survey (Attachment D) indicated that residual levels of contamination, ranging from 6000 dpm – to 30,000 dpm, existed in several areas used in support of U of C operations. No documentation has been found indicating that a clean-up of these areas was performed at the conclusion of U of C contracted activities. Argonne National Lab (ANL) performed a document search in April 2005 (Attachment J) that did not reveal any additional documentation relating to any decontamination activities.

Oak Ridge National Labs (ORNL) performed a second survey on 23 October 1976 to assess the radiological status of the site (Attachment E). This survey was limited in scope. A walkthrough of the areas associated with U-billet shaping activities was completed using hand held radiological instrumentation. ORNL's finding identified a few isolated areas showing traces of alpha and beta-gamma radiation. In general, however, ORNL concluded that there was no surface contamination present and that results of the measurements were indistinguishable from background. The DOE, based on the results of this survey, concluded that no potential existed for significant amounts of residual radioactive material derived from U of C contracted activities existed at the site. This survey formed the basis for DOE not recommending the site for inclusion to the FUSRAP program.

In February and March of 2004, Radiation Safety Services Incorporated (RSSI), performed a limited radiological survey for Valbruna Steel. This survey was performed with the help of current employee's knowledge of U of C contracted operations. The survey encompassed areas that were previously identified as having been used during U of C contracted operations. RSSI performed direct instrument surveys, bulk sampling, borehole investigations, and soil sampling (Attachment F, figure 2). Based on the results of this survey, RSSI concluded that contaminated areas remained at the former Joslyn Manufacturing Site.

In January 2005, Science Applications International Corporation (SAIC) performed a focused radiological survey of the center portion of building 9 and an assessment of potential personnel exposure to residual radioactive contamination at the request of the site owner, Fort Wayne Steel. The North-South bay contains fixed equipment (installed post-U of C contracted activities) that the owner wishes to utilize and is an area where fixed contamination was previously identified. SAIC performed direct instrument surveys for alpha and beta contamination, removable alpha and beta contamination surveys, and gamma exposure rate assessments using hand held meters. The survey identified six additional areas of fixed contamination on columns and beams. SAIC performed the exposure assessment using RESRAD-BUILD version 3.22. SAIC concluded that the exposure to an equipment operator would be negligible.

3.0 SOIL EXPOSURE AND AIR PATHWAYS

3.1 Physical Conditions

The Joslyn Manufacturing Site is located on the Bluffton Till Plain portion of the Central Till Plain physiographic province of Indiana, which is poorly drained upland interrupted by incised stream and river valleys. The site is comprised of twenty three (23) acres with approximately eleven (11) buildings, five (5) of which were present during U of C contracted operations. The site itself has been developed after the cessation of U of C contracted operations with the addition of new buildings and additions to existing buildings used during U-billet shaping operations. The Joslyn Manufacturing Site (now Fort Wayne Steel) is separated from the Valbruna site by a chain link fence and access is limited to a few site personnel that include security guards, the plant manager, and the site health and safety officer. Several wells, believed to be monitoring wells, have been installed on the site and in fact, several were within buildings used during U-billet shaping operations. The boring logs indicated that fill (e.g. concrete, brick, and slag) comprise the first twelve (12) feet of material below building structures whereas areas not covered by structures apparently have up to three (3) feet of fill for grading and leveling. The wells were monitoring wells and have since been filled-in. Boring logs from on-site wells indicate that fill comprises the first three feet, with alternating layers of sand and gravel extending to forty (40) feet, where the Detroit River and Wabash Formations (dolomites) are encountered. The current site owners have recently designed and will install an electromotive system for enhanced collection of trichloroethane in the groundwater. The site for the most part is covered either in concrete, asphalt, or stone. Very little vegetation is in areas where U-billet shaping operations occurred.

3.2 Soil and Air Pathways and Gamma Radiation

Potential air pathway receptors from residual radioactivity at the Joslyn Manufacturing Site include employees currently working in the former buildings used by the Joslyn Manufacturing and Supply Co. during U-billet shaping activities. The site has been developed since the time of U of C contracted activities. Several of the buildings still exist from U of C contracted activities and have been refurbished, i.e. new concrete floors. Potential offsite receptors located in the general vicinity of the site

and may be found in areas that include elementary schools, churches, residential areas, parks, and commercial properties. The average distances of these receptors range from 0.3 miles to 0.5 miles.

In February and March of 2004, RSSI performed borehole measurements and sampling, using a Ludlum 2200 ratemeter and a Ludlum Model 44-10 gamma scintillation detector. A total of ten (10) boreholes were performed, six (6) in a suspected burn area or incinerator operation used during U-billet shaping activities and the remainder in the processing building (Attachment C). Results of the down-hole gamma survey in the suspected burn pit area and the processing area provided by RSSI indicate elevated readings in all boreholes at depths up to ten feet below ground surface when compared to the listed background count rates. The range of background at these locations was between 2,467 cpm and 5,730 cpm.

Soil samples taken from these boreholes ranged from 0.0 pCi/g – 2.07 pCi/g for U-235 and 2.12 pCi/g – 73.5 pCi/g for U-238 (Attachment F, Table 5). The interim screening values in accordance with NUREG – 1757 for surface soils for U-238 and U-235 is 14.0 and 2.9 E-01 pCi/g, respectively. These values represent surficial soil concentrations of individual radionuclides that would be in compliance with the 25 mrem/yr unrestricted release dose limit in 10 CFR 20.1402.

Bulk sampling of several different types of media, (e.g. soil/debris, wall, and cloth), were performed by RSSI in the processing building that resulted in 8.8 pCi/g – 300 pCi/g of U-235 and 167 pCi/g – 17,200 pCi/g of U-238 (Attachment F, Table 6).

Additional surveys were performed by RSSI using direct, survey instrumentation in the processing building gross gamma counts ranged from 6,000 – 80,000 cpm with an instrument background of 3,000 – 5,000 cpm. Gross beta results ranged from 370,000 to 1,111,000 dpm/100cm^2 with an instrument background of 3,700 dpm/100cm^2. Gross alpha readings ranged from 1,096 – 2,632 dpm/100cm^2 with an instrument background of 11 dpm/100cm^2. Along with the direct surveys wipe samples were used to check for removable contamination with beta readings ranging from background to 550.9 dpm/100 cm^2 and alpha readings from background to 206.6 dpm/100 cm^2. Army Regulation (AR) 11-9, Table 5-2, Surface Radioactivity Values (dpm/100 cm^2) for U-nat, U-235, U-238, and associated decay products are 1,000 dpm/100 cm^2 for removable and 5,000 dpm/100 cm^2 for total (fixed and removable).

Radiological surveys performed by SAIC identified six new locations of radioactive contamination along with three previously identified locations of radioactive contamination for a total of nine elevated areas in the NORTH-SOUTH bay – building 9. Results showed areas of elevated beta activity on concrete floor surfaces, at the base of a beam and on an overhead beam. Direct instruments surveys were performed using a Ludlum 2360 meter with a Ludlum 43-89 probe. Results for fixed and removable contamination ranged from 2100 dpm/100 cm^2 – 34,640 dpm/100 cm^2 for fixed beta contamination and from 0 dpm/100 cm^2 – 310 dpm/100 cm^2 for fixed alpha contamination. A Ludlum Model 2929 coupled with a 43-10-1 was used to count smears for removable alpha and beta contamination. Results of the smears showed no removable contamination present in this area.

SAIC used a Ludlum Model 19 MicroR meter to determine gamma exposure rates in the NORTH-SOUTH bay – center of building 9. Background gamma rates in the reference area were determined to be 5 μR/hr, were indistinguishable from background onsite.

SAIC performed a survey that was limited in scope and covered approximately 10% of the floor, equipment, and overhead horizontal surfaces in the North-South bay (building 9). These surfaces were scanned for the total beta radioactivity. RESRAD-BUILD was used by SAIC to perform exposure assessments for radiological contaminants in the North-South bay. SAIC used a building occupancy receptor scenario that assumed an average worker would spend eight hours a day for 250 days a year (along with other factors e.g. air exchange, etc) at work in the North-South bay. SAIC used the surface beta activity results from the natural daughter products present by the decay emissions from the parent isotopes (U-238, U-235, and U-234) for the RESRAD run. The building occupancy receptor scenario included evaluation of the external exposure from penetrating radiation from surface sources, inhalation of airborne radioactive particulates, and secondary ingestion of surface contamination. Results of the RESRAD run indicated that average estimated exposure would be 0.02 mrem/year that is below the 25 mrem/year standard for a member of the general public (10 CFR 20).

Elevated beta-gamma and alpha readings were present as documented in the 1 August 1949 at the time of the HASL survey however; documentation suggests that the Joslyn Manufacturing Site performed work post dating the time of the survey. An office memorandum from F.N. Malone to R.J. Smith, Chief, Miscellaneous Operations Area, Production Division New York Operations Office, Subject: Uranium Rod Requisition NAA-SF-11, confirms a conversation dated 22 January 1952 in which one 20’ and three 10’ rods each 13/16’’ in diameter were to be shipped to the Joslyn Manufacturing and Supply Co. This memorandum provides documentation showing the latest point in time that uranium rod may have been rolled at the Joslyn Manufacturing site based on review of available records.

3.3 Soil Exposure, Air Pathway, and Gamma Radiation Conclusions

Data indicate that elevated concentrations of uranium 235 and 238 are present at the Joslyn Manufacturing Site. The site has undergone renovations in areas that were involved in U-billet shaping operations. Elevated areas of radioactivity associated with U-billet shaping operations still likely exist presently at the site. Data collected by RSSI indicates subsurface contamination may exist in the process building and suspected burn pit areas. The results of direct instrument surveys, performed in 2004 and 2005 indicate that fixed contamination is still present at the site.

Although SAIC’s dose assessment indicates there is no risk under the current use conditions of the North-South bay in Building 9, if the building is remodeled or the site is redeveloped in the future, then the potential for greater exposure may exist. Building 9 is currently not in use; however, its intended use is commercial-industrial. Additionally, the SAIC survey was limited in scope and only covered a small area (10% of building surfaces) affected by U-billet shaping operations. Because interior building contamination is not considered a release governed by CERCLA, actions by a future site owner or operator to remove the building or substantially change its configuration to allow a different use of the building would be a commercial property-use decision with no significance for CERCLA purposes. The building owner would be responsible for any contaminants that are contained in the structures of the building and that could be released to the environment during building demolition or during later operations. Based on the information that is presented, it appears that no further CERCLA action would be appropriate in relation to any radioactive material inside of Building 9.

The document search and subsequent evaluation indicates that there is a potential for U-billet related residual material to have migrated to the environment from inside the buildings. Further investigation is recommended to evaluate the extent of migration of U of C contract-related contamination from U-billet processing areas at the Joslyn Manufacturing Site.

4.0 GROUNDWATER PATHWAY

4.1 Hydrogeologic Setting

Aquifers within Allen County include various glacial and alluvial deposits and underlying limestone, dolomite, and shale. In general, Allen County possesses extensive high-yield bedrock aquifers in the fractured limestone and dolomite that underlay a large portion of the County. Shale aquifers underlie the northeastern part of the County and generally have lower yields. Domestic wells drilled in the dolomitic Detroit River and Wabash Formations, both of which underlie the site, can yield up to 70 gallons per minute (gpm); deeper high-capacity wells have produced up to 400 gpm. These formations are part of the Aboite and Hessen Cassel aquifer systems of Allen County, which is are sensitive groundwater resources (Indiana State designation of the ground water resources in the area) according to the Indiana Geologic Survey (INGS); see *The Hydrogeology of Allen County, Indiana. A Geologic and Ground Water Atlas* or *The Hydrogeology of Allen County* by A. Fleming.

Permeable unconsolidated sediments of the Aboite and Hessen Cassel aquifer systems also provide the significant well yields in Allen County. These aquifers occur in thin bands where glacial outwash, coarse alluvium, and lake sands occupy incised valleys that commonly trend southwest to northeast in Allen County. Wells drilled in these sediments may yield between 10 and 80 gpm, depending on the thickness of the aquifer at the wellhead. The Joslyn Manufacturing Site is located on low-yielding lacustrine silts and clays but high-yield undifferentiated outwash deposits exist immediately to the east.

Of the thirty seven (37) wells within a mile of the site, IDNR databases indicate twenty one (21) are dewatering (2) or industrial use (19), ten (10) are home drinking water wells, and six (6) do not have definitive data to determine use. Half of the home drinking water wells are older (pre-1970). Most dewatering wells appear available for inspection although current disposition is unknown. Medium- to low-quality documentation exists for these wells. A comprehensive hydrogeologic assessment of the site has not been completed but the INGS database provides historic water levels that imply groundwater flows under a 0.1-percent gradient to the northeast towards the St. Marys River. This groundwater flow will be influenced by local conditions, such as the nearby creeks and drainage ways, which cannot be interpreted with current data. Regional groundwater flow likely discharges to the St. Joseph and Maumee Rivers, which are potentially regional sinks.

4.2 Ground Water Pathways

Based on 2000 census data, approximately 120,000 people live within about four miles of the site, including about 23,000 children between the ages of 5 and 17. The nearest residential area is west of and adjacent to the site, just across Junk Ditch, which is the creek running along the western boundary of the site. The nearest hospital (St. Joseph Medical Center) is about two miles from the site. At least five (5) schools are located within one (1) mile of the site.

Swinney Park, which contains both NRCS (National Resource Conservation Service) mapped wetlands and the confluence of Junk Ditch with the St. Marys River, is located approximately 1,100 feet down gradient of the Joslyn Manufacturing Site. Both recreational and educational opportunities at this park may pose a groundwater exposure pathway for U-billet shaping-related contaminants, if found in site groundwater.

Approximately 24% of Allen County residents use groundwater resources as primary water supplies, which equates to about 80,000 people (Purdue University Cooperative Extension Service, J.R. Frankenberger, February 2002). About 15% rely on private wells and the remaining 9% are on public supplies derived from groundwater. Indiana maintains a wellhead-protection database and on-line data mapping system, which indicates the Joslyn Manufacturing Site is not within a regulated wellhead protection zone. Although there are several groundwater wells within the vicinity of the site, the area is urban in nature and water is supplied by the City of Fort Wayne, Water and Sewer Department. Municipal water is obtained from the St. Joseph River north of Fort Wayne (Cedar Creek watershed as primary source) at a rate of about 34 million gallons per day for over 75,500 customers.

The IDNR database and complimentary GIS data indicate that groundwater varies between ten (10) and thirty eight (38) feet below grade (or top of casing), with an average depth of thirteen (13) feet. The fill material and underlying interlayerd coarse and fine-grained lithology indicates that a high potential exists for contaminant leaching to the water table.

Analytical data from on-site and nearby groundwater wells are not available or very minimal.

4.3 Ground Water Pathway Conclusions

The scarcity of existing radiologic data from monitoring wells in conjunction with soil-sampling data that show subsurface contamination indicate an unknown potential exists for contaminant leaching to groundwater. If U-billet shaping -related contaminants reach local groundwater sources, the aforementioned well yields (pumping rates) imply a high migration rate. Although groundwater use is limited due to available municipal water sources, several factors indicate that U-billet shaping-related pollution may pose a risk:

1. The underlying, pollution-sensitive aquifer is considered an available drinking-water resource in Allen County.
2. The transmissivity of the local aquifers really warrants a ground water characterization effort to close the potential pathway. Uranium is one of the most mobile radionuclides. Although its mobility depends on many things, such as pH and redox potential, uranium speciation, etc., we do not know enough about the geochemistry of the uranium at the Joslyn Manufacturing Site to be able to know what form it's in and exactly how mobile it is. However, it is safe to say if it is in the soil, it is probably mobile.
3. In appendix F (RSSI 2004 Survey), there is a discussion as to whether or not all uranium daughters are present (short lived and long lived daughter products). The detection of 2 pCi/g U235 and 75 pCi/g U238 and their short-lived daughters at 4-8 feet bgs in boreholes in the Processing Building is indicative of uranium processing activities. Local historic data also indicate these depths (4-8 feet) are near or at the groundwater table. In addition, the bulk sample in the building exhibits characteristics of uranium processing residue.
4. The nature of the operation, the condition of the building (some dirt floors) and the observation that water is currently and probably has entered the building via windows, doors, cracks and other leak prone areas raises the possibility that loose contamination migrated to subsurface soils and to the groundwater. A potential for release to the groundwater exists if the floors are soil or even if they are not soil, but just in poor repair. Water intrusion into the building increases this migration potential. Also, there are several instances of new concrete over dirt floors.

The investigation of site groundwater is recommended to determine the viability of this exposure pathway.

5.0 SURFACE WATER PATHWAY

5.1 Hydrologic Setting

The topography of the area is described by generally flat land with a slightly lower elevation then the areas to the north and south of the site. Junk Ditch flows along the western border of the site and into the St. Marys River, which promptly empties into the St. Joseph River that is a tributary to the nearby Maumee River. The site resides within the 100- and 500- year floodplains of Junk Ditch. The Joslyn Manufacturing Site also resides within 1/8 to 1/4 mile of three (3) Federal wetlands, which are found to the southwest and north, respectively.

5.2 Surface Water Pathways

The St. Joseph River is the sole source of drinking water for the city of Fort Wayne, which is approximately three (3) miles northeast of the site. An average of 34 million gallons of water per day is drawn from the river for treatment, filtration and distribution that services a population of about 205,727 according to the 2000 census.

The St. Marys River originates in Ohio and flows northwest through Allen County before joining the St. Joseph River to form the Maumee River. In major flood events, historical data indicate that the Junk Ditch (normally a tributary of the St. Marys River) has typically flowed into the Wabash River.

Historical flooding has occurred on site and due to the fact that the buildings have openings that allow weather to intrude into the building there is a potential for a surface water pathway. However, based on available data there is little to no loose contamination present, above current guidelines, which may affect this pathway. Additionally in the early to mid 1980's the site, which includes Valbruna Steel and the Fort Wayne Steel Corp. has been bermed to reduce the potential for flooding.

5.3 Surface Water Pathway Conclusion

No analytical evidence is available to assess the potential release of U-billet shaping-related radiological constituents to the surface-water pathway. Existing soil data collected indicate that the potential for contamination in the surface pathway is low. No additional sampling is warranted at this time to investigate this pathway.

6.0 COMBINED PATHWAY CONCLUSION

A complete combined pathway could not be derived from the information at hand. Data indicate that elevated concentrations of uranium 235 and 238 are present at the Joslyn Manufacturing Site above the interim screening values. The site has undergone renovations in areas that were involved in U-billet shaping operations. Elevated areas of radioactivity associated with U-billet shaping operations still likely exist presently at the site. Data collected by RSSI indicates subsurface contamination may exist in the process building and suspected burn pit areas. Subsurface media may be impacted, in buildings that were used during U-billet shaping operations, below current floors and grades warranting further investigation. The results of direct instrument surveys, performed in 2004 and 2005 indicate that fixed contamination is still present at the site.

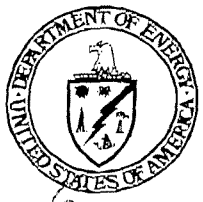
Although SAIC's dose assessment indicates there is no risk under the current use conditions of the North-South bay in building 9, if the building is remodeled, or the site is redeveloped in the future, then the potential for greater exposure may exist. Additionally the SAIC survey was limited in scope and covered a small area affected by U-billet shaping operations.

Additional information from the groundwater pathway needs to be developed in order to complete the assessment.

7.0 SUMMARY AND CONCLUSIONS

The United States Army Corps of Engineers has reviewed all known, existing available data on the Joslyn Manufacturing Site. Based on that review, there is evidence that FUSRAP-eligible hazardous substances, resulting from U of C contract-related activities at the site, may have migrated from on-site buildings but do not pose an imminent threat to human health, safety and the environment. The potential for a future threat to the human health and the environment should be evaluated. Therefore, it is recommended that this Joslyn Manufacturing Site proceed to a Site Investigation (SI). A SI will further characterize radioactive residuals associated with U of C contracted activities under current site conditions.

ATTACHMENT A - DOE Inclusion Letter



Department of Energy

Washington, DC 20585

AUG 26 2004

CW2404100

Major General Carl Strock
U.S. Army Corps of Engineers
Department of the Army
Washington, DC 20314-1000

Dear General Strock:

I am writing to notify you that the former Joslyn Manufacturing and Supply Company site (currently owned by Slater Steels Corporation) in Fort Wayne, Indiana, is potentially eligible for inclusion in the Formerly Utilized Sites Remedial Action Program (FUSRAP).

The Manhattan Engineer District and the Atomic Energy Commission (AEC) used this site for early atomic energy defense activities. AEC usage of this facility ended during the early 1950s. The facility was used to roll and machine uranium rods.

In 1976, Oak Ridge National Laboratory (ORNL) personnel, at the direction of the Energy Research and Development Administration (statutory predecessor of the Department of Energy (DOE)) performed exploratory measurements to determine whether any significant radioactive contamination remained. Results indicated that radioactive surface contamination measurements were, in general, indistinguishable from background. A few isolated locations showed traces of slightly elevated levels of contamination, but these levels were below guidelines for unrestricted release. In 1987, the Joslyn site was eliminated from consideration for FUSRAP because the levels of residual contamination did not warrant remedial action.

However, during the recent due diligence process prior to the pending sale of the facility to Fort Wayne Steel Corporation ("the purchaser"), a focused radiological survey conducted by the purchaser was performed that indicates several areas of elevated uranium contamination that are greater than the levels found in ORNL's 1976 survey (enclosed).

Section III.D.1. of the Memorandum of Understanding (MOU) between the DOE and the Army Corps of Engineers regarding the program administration and execution of the FUSRAP provides that DOE:

a. Shall perform historical research and provide a FUSRAP eligibility determination, with historical references, as to whether a site was used for activities which supported the Nation's early atomic energy program;

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b. Shall provide the Army Corps of Engineers with the determination, a description of the type of processes involved in the historical activities at the site, the geographic boundaries of those activities (as reflected by documentation available to DOE), and the potential radioactive and/or chemical contaminants at the site; and

c. Shall maintain records of determination of eligibility and other files, documents and records associated with the site.

In accordance with the MOU, the DOE has performed historical research regarding the former Joslyn Manufacturing and Supply Company site and has concluded that this site was used for activities which supported the Nation's early atomic energy program.

In addition, the Report of a Focused Radiological Survey at Slater Steels Corporation, Fort Wayne, Indiana transmitted to the DOE in a March 31, 2004, letter from Mr. Sean Bezark, Greenburg Traurig, LLP, (enclosed) indicates that the site is contaminated with levels of uranium greater than those found during ORNL's 1976 survey. However, DOE does not have sufficient information regarding the accessibility of the contamination. An additional site assessment by the Corps will be needed to determine if remedial action is required. My staff previously provided historical information to your staff. [redacted], at [redacted], is the current owner's representative. The facility is located at 2302 Taylor Street West, Fort Wayne, Indiana 46801.

Accordingly, the former Joslyn Manufacturing and Supply Company site would be eligible for inclusion in the FUSRAP if the Corps determines, under section III.D.2 of the MOU, that remedial action is required to address FUSRAP-related contamination at the site.

If you have any further questions, please call me at [redacted] or [redacted], Director, [redacted], at [redacted].

Sincerely,

[redacted]

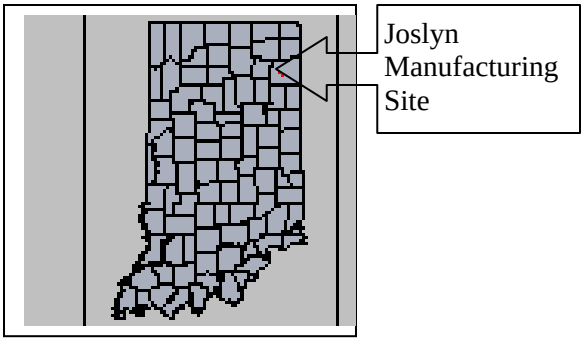
Deputy Assistant Secretary for
Environmental Cleanup and Acceleration

Enclosure

cc: [redacted] Legacy Management
[redacted]

ATTACHMENT B - Site Location

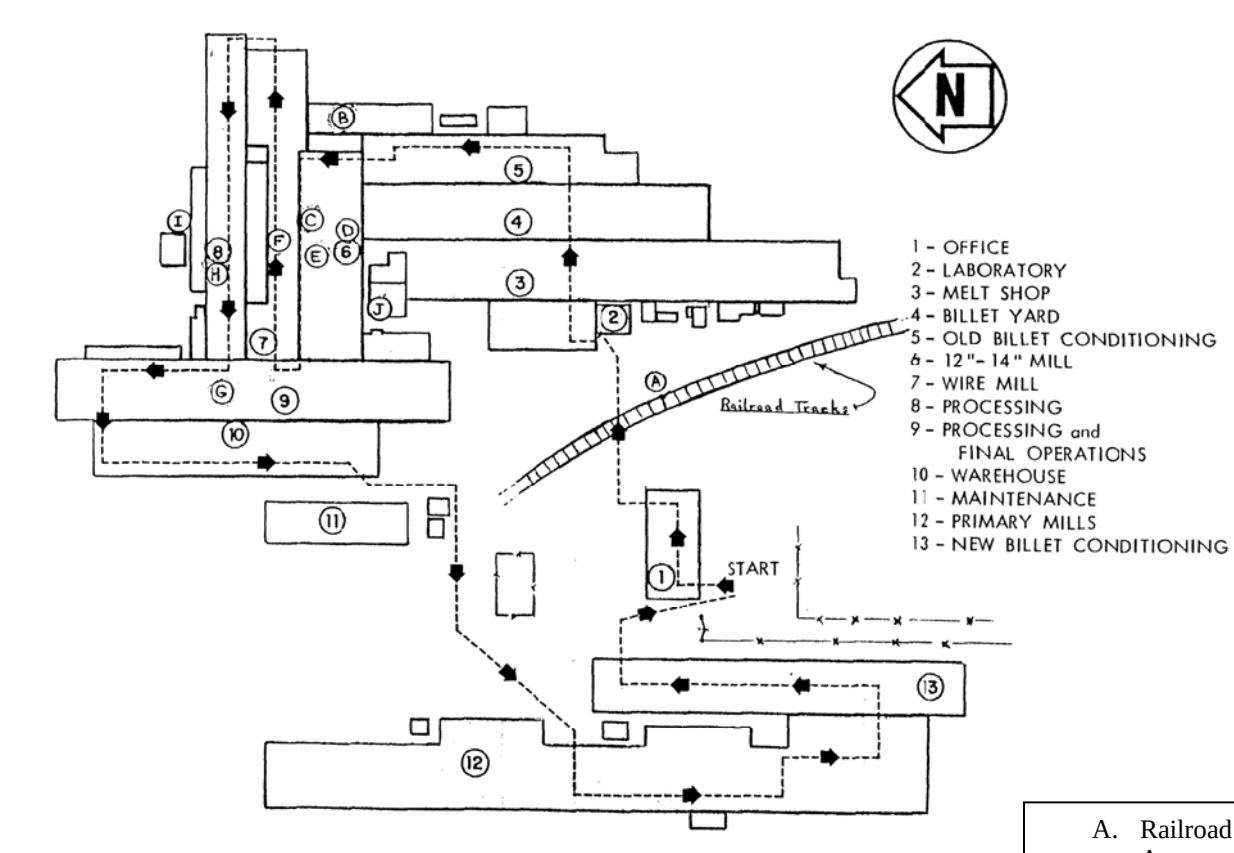
SITE LOCATION



ATTACHMENT C – Area Used During U-Billet Shaping Operations

JOSLYN MANUFACTURING AND SUPPLY CO.
General Layout

VALBRUNA SLATER STAINLESS STEEL (Buildings 11 though 1 on east)
FORT WAYNE STEEL – (Buildings 1o though 11 and on west.



A. Railroad Siding Area
B. Billet Storage Area
C. Furnace Area
D. 18'' Mill
E. 14'' Mill
F. Straightner Area
G. Abrasive Cutting Area
H. Production Grinding Area
I. Burn Area
J. Lathe Turning Area

ATTACHMENT D – AEC Health and Safety Laboratory (HASL) 1949

IN-16

72

The Files August 22, 1949

A. R. Piccot, Radiation Section

RESIDUAL CONTAMINATION SURVEY AT JOSLYN STEEL CO.

REFER TO SYMBOL: DH:ARP

On August 1, 1949 the writer visited the Joslyn Mfg. & Supply Co. rolling mills at Fort Wayne Indiana. Radiation measurements were made with an IDL and a Zeuto on contaminated floors and machinery involved in previous uranium rolling, grinding & machining operations. All work on uranium had ceased except for the removal of drums containing scraps and clean up material which were to be shipped out the following day. Most of the machines were back in operation on other materials. All AEC personnel expected to leave the following day.

Receiving and Storage Area:

Billets were received by boxcar and unloaded at the unloading dock next to the tracks, picked up by overhead crane, carried across the building to within 10 or 15' of the wire cage compound; dropped on carts, wheeled into compound and stored until needed.

Contamination at the unloading dock and along the path taken by the billets from boxcar to compound was very slight with typical readings of 500, 300,300 alpha d/m until the floor at the entrance to and in front of the compound was reached where readings were 2000, 8000, 800. The large building containing the track and receiving dock was 11 bays long by 4 bays wide and contained the rough turner. Except for the vicinity of the rough turner described later, fifteen spot checks in other parts of this building indicated negligible activity (less 300).

Floor readings inside the compound varied from 15,000 to 20,000 with a general background in the center of the room of 0.5 mr/hr. The compound still contained barrels of reclaimed scrap and other material which was to be shipped out the following day along with several others stacked just outside the compound. The scale in the compound gave a reading of 10,000 d/m on the platform. A metal drying pan on the floor outside of the compound gave an inside contamination reading of 20,000 to 30,000 d/m. The field office next to the compound gave floor readings of about 300 d/m.

Heat Treatment Area:

The billets were removed from the compound to the heating furnaces, a distance of some 70', by means of a rail car and stored on racks on each side of a bank of furnaces. They were then heated individually

The Files August 22, 1949

A. R. Piccot

RESIDUAL CONTAMINATION SURVEY AT JOSLYN STEEL CO.

in 8 small resistance type electric heated furnaces to a temperature of 1050° with a natural gas atmosphere. After a 30 minute soaking at this temperature, the billets were carried to the rolls by means of the rail car or an overhead trolley.

The floor from the entrance of the compound to the rail car averaged 1000 d/m with readings of 2000 and 4000 directly over the rail which is recessed into the concrete floor. Readings between the rails from the loading point to furnaces gave following: 600, 200, 200, 2000 in front of the wooden storage rack, 1500 between rack and first furnace, 1600 in front of the furnace, 2500 in front of the second rack, 2000 at the end of the track. The highest IDL contact reading between the track was 0.3 mr/hr. The dirt floor along the right side of the track opposite the furnaces and racks gave readings of 1200, 800, 1000 alpha d/m with a maximum of 0.4 mrep/hr in contact.

The wooden platform and dirt floor in front of the first rack averaged 1000 α d/m and 0.2 mrep/hr. Cross pieces on the rack averaged 500 alpha d/m or less. The wooden catwalks in front of the eight furnaces and the platform in front of the second rack gave beta readings from 5000 to 10,000 and IDL contact readings of 0.5 to 1 mrep/hr.

The top of the furnaces indicated contamination of from 10,000 to 25,000 α d/m and 1 to 2.5 mrep/hr. The IDL with the probe stuck into the furnace registered from 5 to 12 mrep/hr. These furnaces were designed for AEC and are in standby.

Rolling and Quench Area:

The mill rough and finishing rolls are set up immediately adjacent to each other. After rolling, the rods were placed on a roll conveyor and moved for a distance of approximately 80' outside the building where they were stamped for identification. After stamping, the rods were removed from the conveyor and placed over a cooling pit on cross bars for 10 minutes, quenched in a water bosch tank, allowed to cool and removed by jeep to the next operation or to the freight car for shipping.

The mill surroundings are very irregular with dirt, concrete and steel floors, conveyors and trenches and stored material in the vicinity of the mill. A concrete slab, 30' from rolls (path of hot billets) gave beta readings of 800 to 3000 α d/m. Steel flooring 20' behind the rolls gave

The Files August 22, 1949

A. R. Piccot

RESIDUAL CONTAMINATION SURVEY AT JOSLYN STEEL CO.

no detectable contamination and looked clean. In general, steel floorings away from the rolls had only slight contamination. In the immediate vicinity of the rolls (3 or 4' radius) contamination on the steel and cracks between sections varied from 500 to 4,500 α d/m. The screwdown and gearbox housing when dust had settled indicated contamination from 1500 to 2000 α d/m. Spots under the rolls and in inaccessible cracks where oxide scale had fallen gave readings as high as 7 or 8 mrep/hr. One foot out from the rolls the background was about 0.5 mr/hr (probably from material in the pits under the rolls). A hurried check on rolls while turning showed no significant alpha. A pile of steel guides used in the uranium rolling (pile 20' from rolls) indicated as high as 15,000 α d/m and 4 mr/hr in contact. The trench under the conveyor to the quench tank was oil soaked and gave readings of 3 or 4 mrep/hr. The quench tank area was cluttered with stored material and the dirt was wet from splashing. Contamination was detectable within a 15' radius and readings from 0.5 to 1 mrep/hr at one foot high and 2 mr in contact with dirt were observed.

Cropping on Cutamatic:

After quenching, the rods are bundled (six to a bundle) and are carried to the cut-off machine, called cutamatic, which is located in the cold finishing department. The rough ends were cropped while a heavy flow of coolant was used over the cutting tool and rod end to minimize sparking hazard.

The machine is surrounded by a concrete floor with detectable contamination 20' from the machine. Contamination on the floor next to the machine varied from 2,000 to 10,000 α d/m, and 0.5 to 2 mrep/hr. The floor under the rack which supported the rods had contamination as high as 20,000 α d/m and 10 to off scale on the IDL. Contamination on the outside of the housing near the cutter was as high as 20,000 α d/m and 0.2 to 1 mrep/hr with 30,000 α d/m in the bottom of the coolant reservoir and 20 mrep/hr or more on the IDL. Background 3' high in front of the rack was 0.5 to 2 mr/hr with 1 to 3 mrep/hr in back of the rack. Oxide contamination was visible on the floor under the rack and apparently had not been cleaned. Other cracks and catch basins on the machine gave 10 to off-scale readings on the IDL. In order to clean these remote parts, the machine would probably have to be dismantled.

The Files August 22, 1949

A. R. Piccot

RESIDUAL CONTAMINATION SURVEY AT JOSLYN STEEL CO.

The concrete floor in front of the machine indicated 3000 d/m and steel gratings on the floor gave 10 to off-scale readings on the IDL, due to material which had fallen in trenches under the gratings. Contamination on the wood rack varied from 2000 to 3000 d/m. A spare grinding wheel next to the machine read 2 to 3 mrep/hr. in contact and 5000 to 8000 d/m. The machine was being prepared for use on other materials on the following day.

Threading Machine:

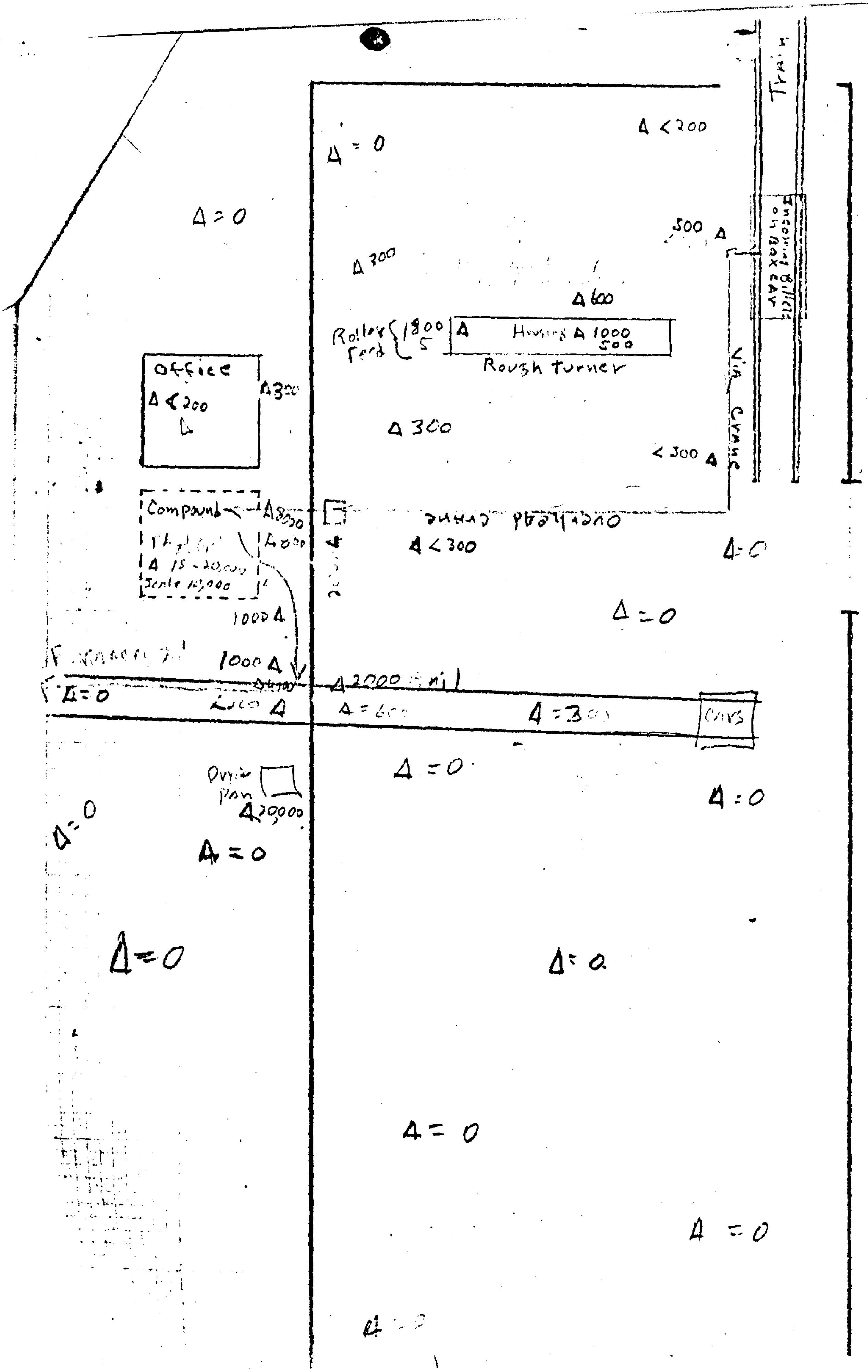
The threading was done on a Pratt & Whitney 15" lathe with a continuous flow of coolant over the cutting point.

The lathe and surroundings were only moderately contaminated with the floor in front of the lathe giving 1100 d/m and lathe parts less than 300 d/m. The supporting wood rack had negligible contamination except for 3 guide grooves which indicated from 3000 to 5000 d/m.

Other Areas:

No detectable contamination was observed in the inspection department. The scrap area behind the factory contained contaminated materials such as drying pans, broken cutomatic wheels, wood, etc. Readings up to 10 mrep/hr were observed with the IDL in contact with some of these materials.

The purpose of this survey was to obtain a record of the contamination and radiation levels and, therefore, no recommendations or conclusions are necessary in this memorandum.


Train
Δ < 200
Δ = 0
Δ = 0
500 Δ
Incoming Billets on Box car
Δ 300
Δ 600
Roller Feed {1800 5
Δ Housing Δ 1000 500
Rough turner
Office
Δ < 200
Δ 300
Δ 300
< 300 Δ
Via Crane
Overhead crane
Compound
Δ 8000
Δ 4000
Δ 15 - 20,000
Scale 10,000
Δ < 300
Δ = 0
Δ = 0
1000 Δ
1000 Δ
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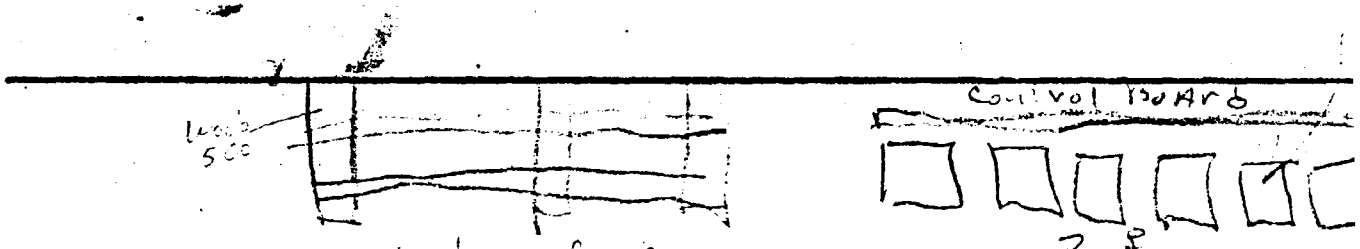


A 2000	A 1500	A 1500
Dirt floor A 1200	A 800	Dirt A 1000

ATTACHMENT E – Oak Ridge National Lab Survey (ORNL) 1976

IN.1-2

IN,01

PRELIMINARY SURVEY OF JOSLYN STAINLESS STEEL COMPANY FORT WAYNE, INDIANA

Work performed
by the
Health and Safety Research Division
Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830

March 1980

OAK RIDGE NATIONAL LABORATORY
operated by
UNION CARBIDE CORPORATION
for the
DEPARTMENT OF ENERGY
as part of the
Formerly Utilized Sites--
Remedial Action Program

JOSLYN STAINLESS STEEL COMPANY
Fort Wayne, Indiana

At the request of the Department of Energy (DOE, then ERDA), a preliminary survey was performed at the Joslyn Stainless Steel Company in Fort Wayne, Indiana (see Fig. 1), on October 23, 1976, to assess the radiological status of those facilities utilized under MED/AEC contract during the period 1944 through 1949. Edwin E. Hodgess, Jr., Vice President of Operations, provided information on Atomic Energy Commission (AEC) operations at this site and identified those parts of the plant involved in the process. A large part of this information was obtained by Hodgess from Paul Lauletta, a former Joslyn employee directly involved in the MED/AEC project.

The project involved the conversion of uranium billets into metal rods. The primary operations involved were heating, hot rolling, quenching, straightening, cooling, grinding, abrasive cutting, waste burning, and threading. Areas involved, designated by letters A through J, are shown on the attached plant layout (Fig. 2). The use made of each area and the sequence of operations are shown on Fig. 3. The billets were received by rail, unloaded at an unloading dock and transported by cart and overhead crane to the storage area. Movement of the billets from storage through the remainder of the process was accomplished by rail car, conveyor, and overhead trolley. The floors in the process area were dirt, concrete, and steel. All ash and residue from the burn area (Fig. 3, section I) were recovered by AEC for uranium accountability.

Present Use of Facilities

The grounds, buildings, and some equipment used during the uranium operations are presently being utilized by Joslyn. The furnaces were removed at the conclusion of the AEC contract. The equipment used in cutting, grinding, straightening, and threading is gone, and new concrete floors now cover these areas. The uranium billet storage area is presently used as a roll shop, and the 36-cm rolling mill is still in operation. The 46-cm mill was sold to AMEX Speciality Metal Corporation, Coldwater, Michigan, and the 23-cm mill was brokered through the T. B. Hudson Company and was believed to have been shipped to Sonora, Mexico.

Results of Preliminary Survey

The present survey was conducted on October 23, 1976, by H. W. Dickson of the Oak Ridge National Laboratory and W. T. Thornton of the Department of Energy-Oak Ridge Operations Office (then ERDA). A complete walk-through survey was performed with numerous radiation measurements made in each of the areas A through J involved in the uranium operations (see Fig. 2). Measurements were made of direct alpha, direct beta-gamma, transferable alpha, transferable beta-gamma, and external gamma-ray exposure rate. In general, there was no surface contamination; measurements made were indistinguishable from instrument background. A few isolated spots showed traces of alpha and beta-gamma contamination. The maximum alpha reading observed was 300 dpm/100 cm^2 and was found on the wall of the straightener area F. The maximum beta-gamma reading detected was 0.1 mrad/hr and located at an isolated spot in area B, now used as the roll shop. No transferable contamination was detected. The average external gamma radiation level ranged from 6-8 μR/hr and compares favorably with the natural radiation background for the area.

The last documented radiological survey, prior to the October 23, 1976, survey, of the Joslyn facilities was performed by A. R. Piccot of the AEC Health and Safety Laboratory (HASL) on August 1, 1949. The 1949 survey was carried out after all uranium operations had ceased and apparently before cleanup was complete. The HASL survey (1949) reported beta-gamma radiation levels as high as 20 mrad/hr (see attached report). All efforts to contact Mr. Piccot concerning the existence of any later survey have been unsuccessful. However, since accountability procedures in effect at the time of the operation required that all uranium scrap, oxides, residues, and wastes be returned to AEC, it is highly unlikely that quantities of radioactivity sufficient to present a potential health hazard would exist under new concrete surfaces or structures.

Because of the foregoing premise and since no radioactivity of significance was detected during the October 23, 1976, survey, it was concluded that no present or potential radiation-related health hazard exists due to MED/AEC operations and that no further DOE survey is required at the Fort Wayne facilities of Joslyn Stainless Steel.

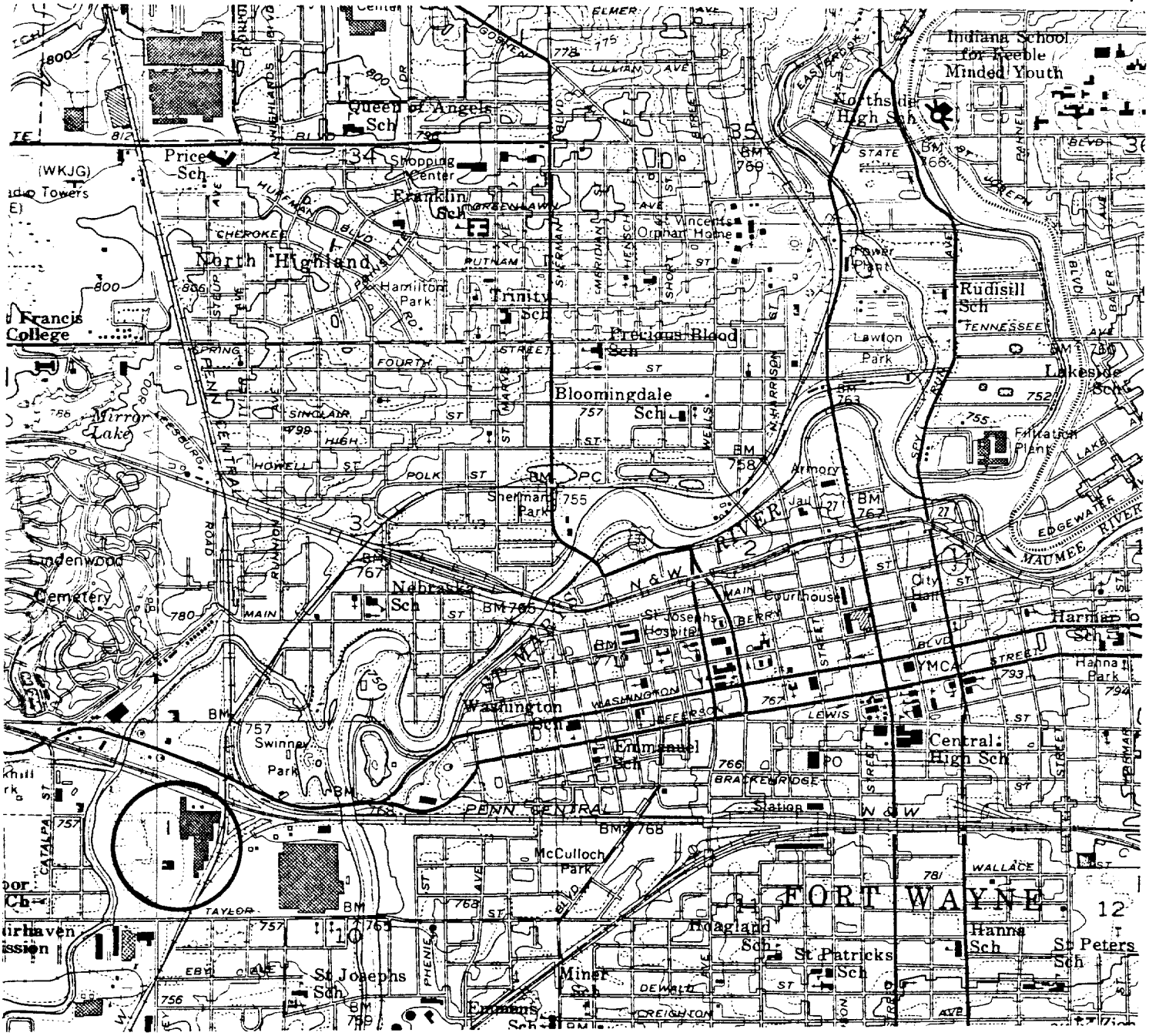
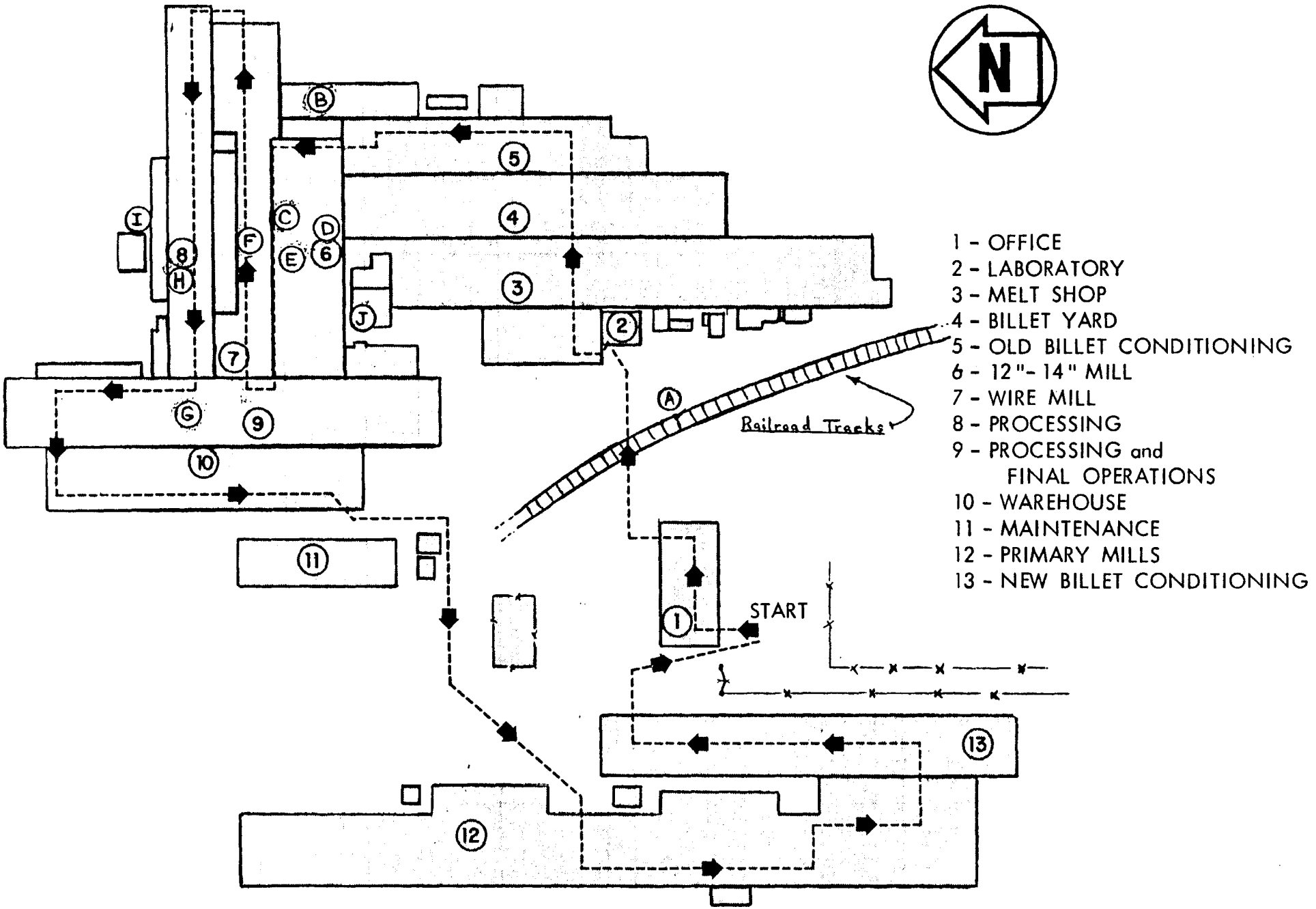


Fig. 1. Location of Joslyn Stainless Steel Company in Fort Wayne, Indiana.

JOSLYN STAINLESS STEELS



The alphabetical designation represents the sequence or material flow of the operation.

A. Railroad siding, billet receiving area: transfer to Area B was along a path which is now covered by Buildings 3, 4, and 5.

B. U billet storage - presently used as roll shop.

C. Furnace area: furnaces were removed at conclusion of AEC contract.

D. 18" mill used to roll larger billets: this mill has been sold to AMEX Speciality Metal Corporation, Coldwater, Michigan.

E. 14" mill used for rolling smaller billets: still in operation.

9" mill also was used for smaller U billets; this mill was sold, brokered through T. B. Hudson Company and thought to have been shipped to Sonora, Mexico.

F. Straightener area: equipment is gone and a new concrete floor now covers area.

G. Abrasive cutting area: equipment is gone and a new concrete floor covers area.

H. Production grinding area: equipment is gone and a new concrete floor covers area.

I. Burn area: all ash and residue recovered by AEC for uranium accountability.

J. Lathe turning area: lathe used to put screw threads on each U rod is gone; rods were packaged for shipment in this area.

Fig. 3. Uranium operation areas at the Joslyn Stainless Steel Company in Fort Wayne, Indiana.

(12)

The Files August 22, 1949

A. R. Piccot, Radiation Section

RESIDUAL CONTAMINATION SURVEY AT JOSLYN STEEL CO.

REFER TO SYMBOL: DH:ARP

On August 1, 1949 the writer visited the Joslyn Mfg. & Supply Co. rolling mills at Fort Wayne Indiana. Radiation measurements were made with an IDL and a Zeuto on contaminated floors and machinery involved in previous uranium rolling, grinding & machining operations. All work on uranium had ceased except for the removal of drums containing scraps and clean up material which were to be shipped out the following day. Most of the machines were back in operation on other materials. All AEC personnel expected to leave the following day.

Receiving and Storage Area:

Billets were received by boxcar and unloaded at the unloading dock next to the tracks, picked up by overhead crane, carried across the building to within 10 or 15' of the wire cage compound; dropped on carts, wheeled into compound and stored until needed.

Contamination at the unloading dock and along the path taken by the billets from boxcar to compound was very slight with typical readings of 500, 300,300 alpha d/m until the floor at the entrance to and in front of the compound was reached where readings were 2000, 8000, 800. The large building containing the track and receiving dock was 11 bays long by 4 bays wide and contained the rough turner. Except for the vicinity of the rough turner described later, fifteen spot checks in other parts of this building indicated negligible activity (less 300).

Floor readings inside the compound varied from 15,000 to 20,000 with a general background in the center of the room of 0.5 mr/hr. The compound still contained barrels of reclaimed scrap and other material which was to be shipped out the following day along with several others stacked just outside the compound. The scale in the compound gave a reading of 10,000 d/m on the platform. A metal drying pan on the floor outside of the compound gave an inside contamination reading of 20,000 to 30,000 d/m. The field office next to the compound gave floor readings of about 300 d/m.

Heat Treatment Area:

The billets were removed from the compound to the heating furnaces, a distance of some 70', by means of a rail car and stored on racks on each side of a bank of furnaces. They were then heated individually

The Files August 22, 1949

A. R. Piccot

RESIDUAL CONTAMINATION SURVEY AT JOSLYN STEEL CO.

in 8 small resistance type electric heated furnaces to a temperature of 1050° with a natural gas atmosphere. After a 30 minute soaking at this temperature, the billets were carried to the rolls by means of the rail car or an overhead trolley.

The floor from the entrance of the compound to the rail car averaged 1000 d/m with readings of 2000 and 4000 directly over the rail which is recessed into the concrete floor. Readings between the rails from the loading point to furnaces gave following: 600, 200, 200, 2000 in front of the wooden storage rack, 1500 between rack and first furnace, 1500 in front of the furnace, 2500 in front of the second rack, 2000 at the end of the track. The highest IDL contact reading between the track was 0.3 mr/hr. The dirt floor along the right side of the track opposite the furnaces and racks gave readings of 1200, 800, 1000 alpha d/m with a maximum of 0.4 mrep/hr in contact.

The wooden platform and dirt floor in front of the first rack averaged 1000 α d/m and 0.2 mrep/hr. Gross pieces on the rack averaged 500 alpha d/m or less. The wooden catwalks in front of the eight furnaces and the platform in front of the second rack gave zeuto readings from 5000 to 10,000 and IDL contact readings of 0.5 to 1 mrep/hr.

disposition

The top of the furnaces indicated contamination of from 10,000 to 25,000 α d/m and 1 to 2.5 mrep/hr. The IDL with the probe stuck into the furnace registered from 5 to 12 mrep/hr. These furnaces were designed for AEC and are in standby.

Rolling and Quench Area:

The mill rough and finishing rolls are set up immediately adjacent to each other. After rolling, the rods were placed on a roll conveyor and moved for a distance of approximately 80' outside the building where they were stamped for identification. After stamping, the rods were removed from the conveyor and placed over a cooling pit on cross bars for 10 minutes, quenched in a water bosch tank, allowed to cool and removed by jeep to the next operation or to the freight car for shipping.

The mill surroundings are very irregular with dirt, concrete and steel floors, conveyors and trenches and stored material in the vicinity of the mill. A concrete slab, 30' from rolls (path of hot billets) gave zeuto readings of 800 to 3000 α d/m. Steel flooring 20' behind the rolls gave

The Files August 22, 1949

A. R. Piccot

RESIDUAL CONTAMINATION SURVEY AT JOSLYN STEEL CO.

no detectable contamination and looked clean. In general, steel floorings away from the rolls had only slight contamination. In the immediate vicinity of the rolls (3 or 4' radius) contamination on the steel and cracks between sections varied from 500 to 4,500 α d/m. The screwdown and gearbox housing when dust had settled indicated contamination from 1500 to 2000 α d/m. Spots under the rolls and in inaccessible cracks where oxide scale had fallen gave readings as high as 7 or 8 mrep/hr. One foot out from the rolls the background was about 0.5 mr/hr (probably from material in the pits under the rolls). A hurried check on rolls while turning showed no significant alpha. A pile of steel guides used in the uranium rolling (pile 20' from rolls) indicated as high as 15,000 α d/m and 4 mr/hr in contact. The trench under the conveyor to the quench tank was oil soaked and gave readings of 3 or 4 mrep/hr. The quench tank area was cluttered with stored material and the dirt was wet from splashing. Contamination was detectable within a 15' radius and readings from 0.5 to 1 mrep/hr at one foot high and 2 mr in contact with dirt were observed.

Cropping on Cutamatic:

After quenching, the rods are bundled (six to a bundle) and are carried to the cut-off machine, called cutamatic, which is located in the cold finishing department. The rough ends were cropped while a heavy flow of coolant was used over the cutting tool and rod end to minimize sparking hazard.

The machine is surrounded by a concrete floor with detectable contamination 20' from the machine. Contamination on the floor next to the machine varied from 2,000 to 10,000 α d/m, and 0.5 to 2 mrep/hr. The floor under the rack which supported the rods had contamination as high as 20,000 α d/m and 10 to off scale on the IDL. Contamination on the outside of the housing near the cutter was as high as 20,000 α d/m and 0.2 to 1 mrep/hr with 30,000 α d/m in the bottom of the coolant reservoir and 20 mrep/hr or more on the IDL. Background 3' high in front of the rack was 0.5 to 2 mr/hr with 1 to 3 mrep/hr in back of the rack. Oxide contamination was visible on the floor under the rack and apparently had not been cleaned. Other cracks and catch basins on the machine gave 10 to off-scale readings on the IDL. In order to clean these remote parts, the machine would probably have to be dismantled.

The Files August 22, 1949

A. R. Piccot

RESIDUAL CONTAMINATION SURVEY AT JOSLYN STEEL CO.

The concrete floor in front of the machine indicated 3000 d/m and steel gratings on the floor gave 10 to off-scale readings on the IDL, due to material which had fallen in trenches under the gratings. Contamination on the wood rack varied from 2000 to 3000 d/m. A spare grinding wheel next to the machine read 2 to 3 mrep/hr. in contact and 5000 to 8000 d/m. The machine was being prepared for use on other materials on the following day.

Threading Machine:

The threading was done on a Pratt & Whitney 15" lathe with a continuous flow of coolant over the cutting point.

The lathe and surroundings were only moderately contaminated with the floor in front of the lathe giving 1100 d/m and lathe parts less than 300 d/m. The supporting wood rack had negligible contamination except for 3 guide grooves which indicated from 3000 to 5000 d/m.

Other Areas:

No detectable contamination was observed in the inspection department. The scrap area behind the factory contained contaminated materials such as drying pans, broken cutomatic wheels, wood, etc. Readings up to 10 mrep/hr were observed with the IDL in contact with some of these materials.

The purpose of this survey was to obtain a record of the contamination and radiation levels and, therefore, no recommendations or conclusions are necessary in this memorandum.

ATTACHMENT F – RSSI Survey 2004

(43)

REPORT OF A FOCUSED RADIOLOGICAL SURVEY
AT
SLATER STEELS CORPORATION
FORT WAYNE, INDIANA FACILITY

PERFORMED FOR

FORT WAYNE STEEL CORP.
FORT WAYNE, IN

BY

RSSI
6312 W. OAKTON STREET
MORTON GROVE, ILLINOIS

March 24, 2004

INTRODUCTION

Uranium

Uranium (U), a heavy metal, is used in the production of nuclear weapons. Natural uranium (U-nat) is approximately 0.7% uranium-235 (U-235) and 99.3% uranium-238 (U-238). Both isotopes are at or near the beginning of two naturally occurring series of radionuclides that end in stable isotopes of lead (Attachment A).

One isotope, U-238, is irradiated in a reactor to produce plutonium-239, the material used in the first weapon tested at Alamogordo, New Mexico and in the weapon dropped on Nagasaki. The other isotope, U-235, can be separated from the U-238 in natural uranium and used in the type of weapon dropped on Hiroshima.

All isotopes of uranium are naturally radioactive and present several hazards to humans. U-235 and U-238 are alpha emitting radionuclides and, when deposited in the body, can induce cancer. When exposure to uranium is high, its acute toxicity as a heavy metal is more significant than the delayed effects from its radioactive properties. Protecting workers handling uranium presents unusual challenges because of the combination of chemical and radiological hazards.

Joslyn History

Beginning in August of 1943, the Joslyn Manufacturing and Supply Company (Joslyn) in Fort Wayne, Indiana processed uranium rod under a contract with the University of Chicago (U of C). This contract is in Appendix A. Contemporary documentation indicates that Joslyn was selected for its expertise in centerless grinding. The contract with the U of C appears to have been terminated in 1946. Documentation indicates that Joslyn continued to process uranium for the Atomic Energy Commission (AEC) until 1949. Joslyn also processed uranium rod into the 1950s to supply material to Great Britain. All work with uranium appears to have been completed prior to the Atomic Energy Act of 1954. Most if not all of the material appears to have been U-nat.

The production and finishing of uranium has a potential to produce contamination by several mechanisms. The heating and rolling of rod would result in the production of an oxide scale that could be dislodged and contaminate the building and equipment. Centerless grinding and cutting operations are likely to have produced large amounts of oxide when the uranium, which is pyrophoric, burned when

small particles were created. The oxide that is produced can result in contamination and elevated radiation level.

Prior Surveys

1949 Survey

A survey performed in 1949 at the end of AEC operations is reported to have found extensive contamination and elevated radiation levels inside of the buildings listed in Table 1. This report was obtained as an attachment to a report of a 1976 survey (Appendix B.). The 1976 survey is the only other survey known to have been performed. It is missing page 5 of the 1949 report. The available pages of the 1949 report make no mention of the Processing Building, where centerless grinding is believed to have been performed (Figure 2 of Appendix B). A tabulation of the quantitative results reported in narrative form in the 1949 survey appears in Table 1 below. Units are defined in the glossary. This survey did not contain a map and the relationship of areas thought to be contaminated with current use areas is based upon descriptive information.

Table 1. 1949 Surveys

RECEIVING AND STORAGE AREA

This area appears to be in the current Melt Shop.

Location	**dpm**	**mR/hr**	**mrep/hr**
Background (center of room)		0.5	
Floor at the entrance	2,000		
Floor at the entrance	8,000		
Floor at the entrance	800		
Unloading dock	500		
Unloading dock	300		
Unloading dock	300		
Floor readings	15,000-18,000		
Scale	10,000		
Metal drying pan	20,000-30,000		
Field office	300		

HEAT TREATMENT AREA

This appears to be at the east end of the current Bar Mill and Roll Garden.

Location	**dpm**	**mR/hr**	**mrep/hr**
Floor (entrance to rail car)	1,000		

Rail	2,000-4,000		
Rail (from loading to furnaces)	600		
Rail (from loading to furnaces)	200		
Rail (from loading to furnaces)	200		
In front of wooden storage rack	2,000		
Between tracks		0.3	
Between rack and first furnace	1,600		
In front of furnace	1,600		
In front of second rack	2,500		
End of track	2,000		
Right side of track	1,200		
Right side of track	800		
Right side of track	1,000		
Right side of track			0.4
Wooden platform in front of first rack	1,000		0.2
Gross pieces on platform	500		
Wooden catwalks	5,000-10,000		0.5-1
Top of furnaces	10,000-25,000		1-2.5
Inside furnaces			5.0-12

ROLLING AND QUENCH AREA

This area appears to be the current Bar Mill.

Location	**dpm**	**mR/hr**	**mrep/hr**
Concrete slab	800-3,000		
rolls	500-4,500		
Screwdown and gearbox housing	1,500-2,000		
Underneath rolls			7 or 8
Background (1 foot from rolls)		0.5	
Steel guides	15,000	4	
Trench under conveyor			3 or 4
Quench tank area (at 1 foot)			0.5-1
Quench tank area (at surface)		2	

CROPPING ON CUTAMATIC (Cold Finishing Department)

This appears to be the current Cold Finishing North-South Bay

Location	**dpm**	**mR/hr**	**mrep/hr**
Floor next to machine	2,000-10,000		0.5-2
Rod-supporting rack	20,000		over 20
Outside housing near cutter	20,000		0.2-1
Bottom of coolant reservoir	30,000		20
Background (front of rack)		0.5-2	
Background (back of rack)			1-3
Floor in front of machine	3,000		
Steel gratings			over 20

Wood rack	2,000-3,000		
Spare grinding wheel	5,000-8,000		2-3

THREADING MACHINE

This appears to have been in the Machine Shop and corresponds to area J (the lathe turning area) in the 1976 report.

Location	**dpm**	**mR/hr**	**mrep/hr**
Floor in front of lathe	1,100		
Lathe parts	300		
Three guide grooves	3,000-5,000		

OTHER AREAS

Location	**dpm**	**mR/hr**	**mrep/hr**
Scrap behind factory			10

A contemporary economic analysis of the Joslyn operation, performed in conjunction with the transfer of uranium rod to Great Britain, indicated that 500 pounds of oxide were produced for every 1000 pounds of finished rod. Much of this oxide is likely to have been airborne and may have deposited on surfaces throughout the buildings or to have escaped in vagrant emissions. Similar operations in other facilities are known to have produced extensive contamination inside buildings and in the areas around the facilities.

1976 Survey

The 1976 survey included the Processing Building and reported only limited contamination in the buildings. The 1976 surveyor has stated, in a personal communication with RSSI, that he was on the Joslyn site for no more than two or three hours. The report of the 1976 survey states that no record of cleanup activities or additional survey had been found. The 1976 survey report identified location I on Figure 2 of Appendix B as a burn area.

Table 2. 1976 Surveys

U billet storage
Indicated as location B in the 1976 survey report.

Location	**dpm mrad/hr**
Isolated spot	0.1

Straightener Area
Indicated as location F in the 1976 survey report.

Location	**dpm**	**mR/hr**
Wall	300	

FUSRAP

Many sites where uranium was processed in support of weapons production were known to be contaminated at the time when operations ceased. Some of these sites were placed in the Formerly Utilized Site Remedial Action Program (FUSRAP) by the AEC. The Department of Energy (DOE) was mandated to remediate these sites but failed to meet its goal. The Joslyn site had been on the list but was removed in the 1980s as a result of the 1976 survey. In 1998, Congress determined the AEC's successor, the Department of Energy, was not responding adequately in cleaning up FUSRAP sites and transferred responsibility for mitigation of the sites to the U.S. Army Corps of Engineers (USACE). The Joslyn site is currently not on the FUSRAP list.

For the Joslyn site to again be added to FUSRAP, DOE must perform historical research and determine if the site is eligible. This determination will consider whether the site was used for the early atomic energy program and numerous other factors. DOE will reach a decision on this and provide USACE with a description of the type of processes involved in the historical activities at the site, the geographic boundaries of those activities, and the potential radioactive and chemical contaminants at the site.

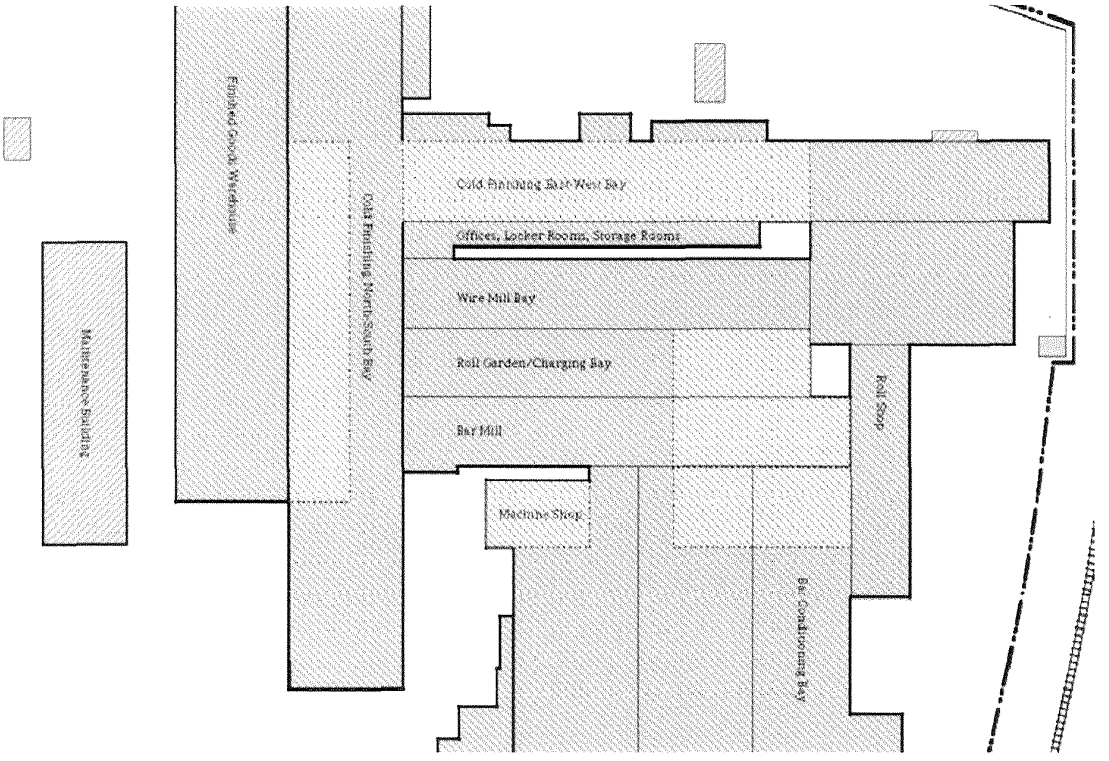
USACE will conduct necessary field surveys and prepare a preliminary assessment (PA) required by the National Contingency Plan. USACE will determine the extent of contamination at the site, as well as at vicinity properties, and other locations that may contain materials related to the site. If USACE determines that the materials pose a threat to human health or the environment, USACE

will determine the extent that response action under appropriate laws is required to cleanup the site. During the PA process, USACE will consult with the DOE if any of the surveys, investigations, or data analyses were inconsistent with the DOE's historical description of the potential contaminants and processes at the site. USACE is committed to recovering costs (i.e., seeking contribution or cost recovery, as appropriate) from any viable Potentially Responsible Party (PRP) that may be legally liable for cleanup of any contaminants under FUSRAP, consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

METHODOLOGY

In February and March of 2004, RSSI performed a limited survey to determine if contamination was present at the Joslyn site. This survey was performed to determine if the need for a characterization existed but was not intended to radiologically characterize the site. Measurements performed in March had the benefit of a current employee's knowledge of where some uranium operations were performed. The area of focused surveys is shown in Figure 1.

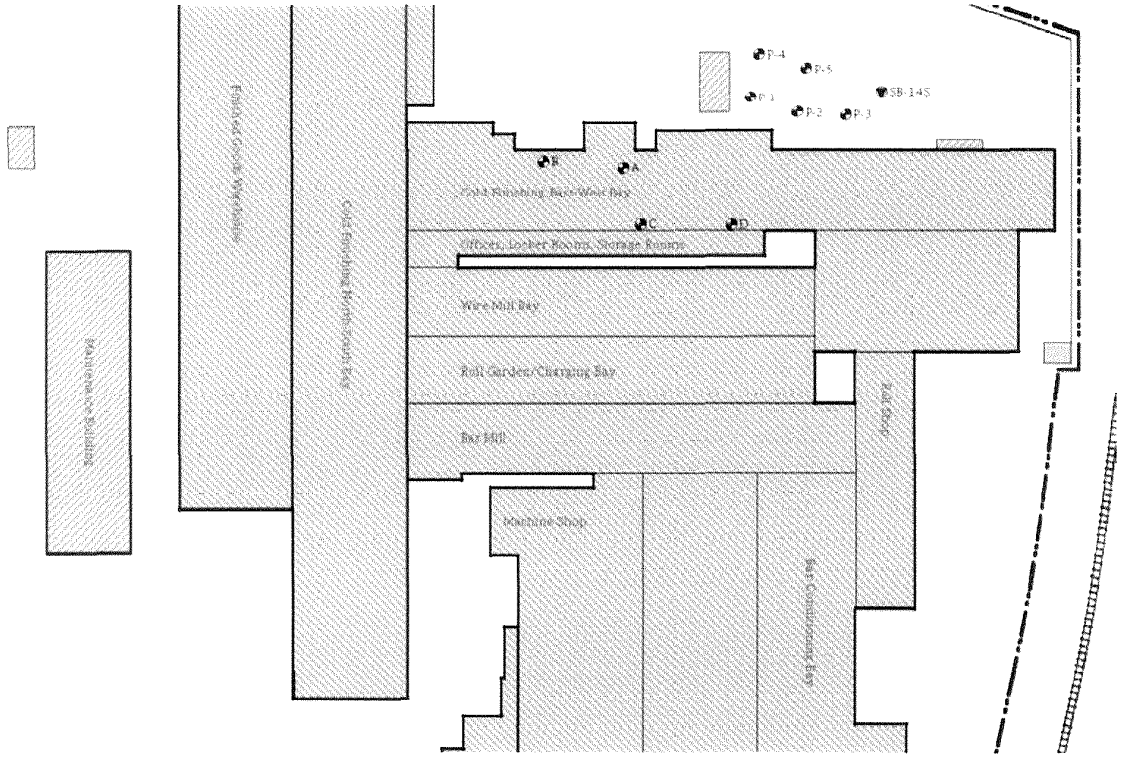
Figure 1. Focused Survey Area



Borehole Investigations

Because of the potential for contamination in a burn area or in an incinerator operation known at other similar uranium metal processing sites, a borehole investigation was conducted at location I on February 25. On March 9, additional borehole measurements were performed in the Processing Building. Borehole measurements were made using a Ludlum Model 2200 with a Ludlum Model 44-10 gamma scintillation detector or a Health Physics Instruments Model 5530 gamma scintillation detector. Borehole measurements are qualitative and are reported in cpm. Borehole locations are in Figure 2.

Figure 2. Borehole Locations



Bulk Samples

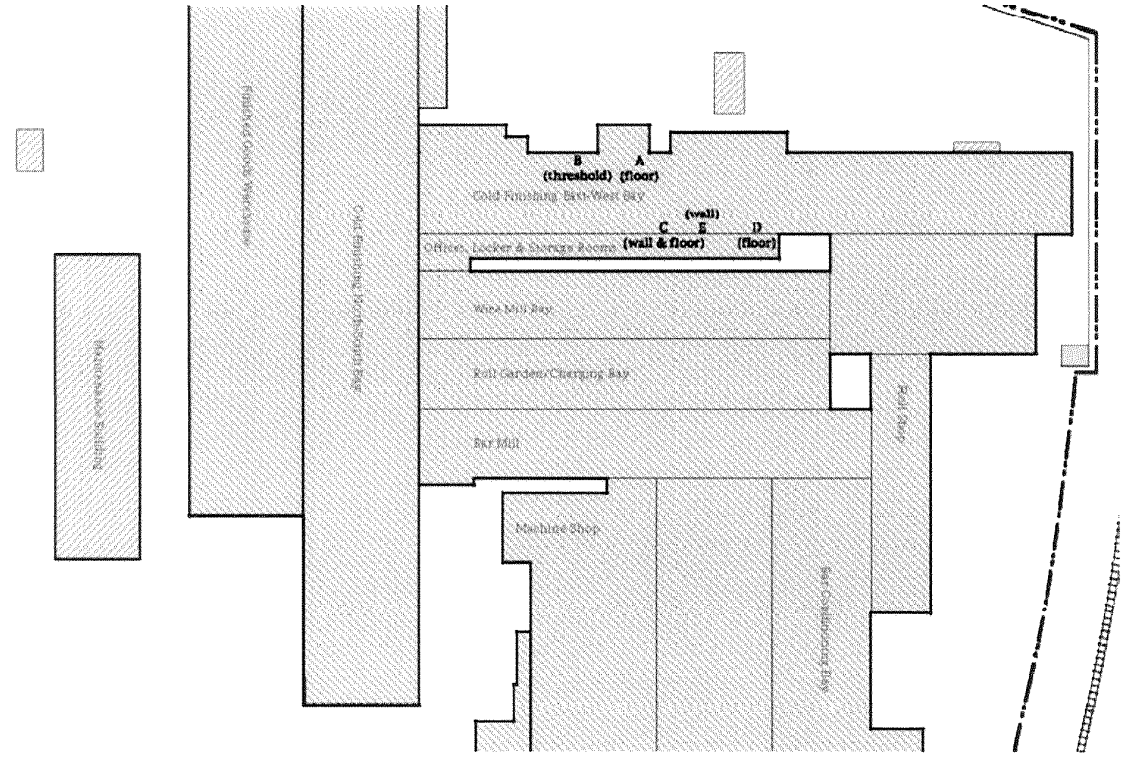
Bulk samples were collected from each borehole in the suspected burn area and from boreholes and other locations in the Processing Building where direct instrument reading levels were elevated. Borehole samples and other bulk samples were placed in 500 ml marinelli beakers and analyzed on a Nucleus PCA II high resolution

gamma spectroscopy system. Bulk sample analysis results are quantitative and are reported by radionuclide in pCi/g.

Direct Instrument Surveys

Direct reading gamma walkover surveys were performed in February in areas marked for uranium work in Figure 2 of Appendix B. Surveys performed in March were in areas that a current employee identified as the locations of machines used for uranium work. Gamma measurements performed in the walkover survey are quantitative and are reported in cpm. Where gamma measurements were elevated, alpha and beta measurements were performed. The measurements were made using a Ludlum 193 survey meter with a Ludlum model 44-10 probe or with an Eberline PG-2 probe. Alpha surveys were performed using a Ludlum Model 16 with alpha scintillation detector and beta surveys were performed using a Ludlum Model 3 with a Ludlum Model 44-9 pancake probe. Alpha and beta measurements are reported in dpm/100 cm^2. Direct instrument survey locations are in Figure 3.

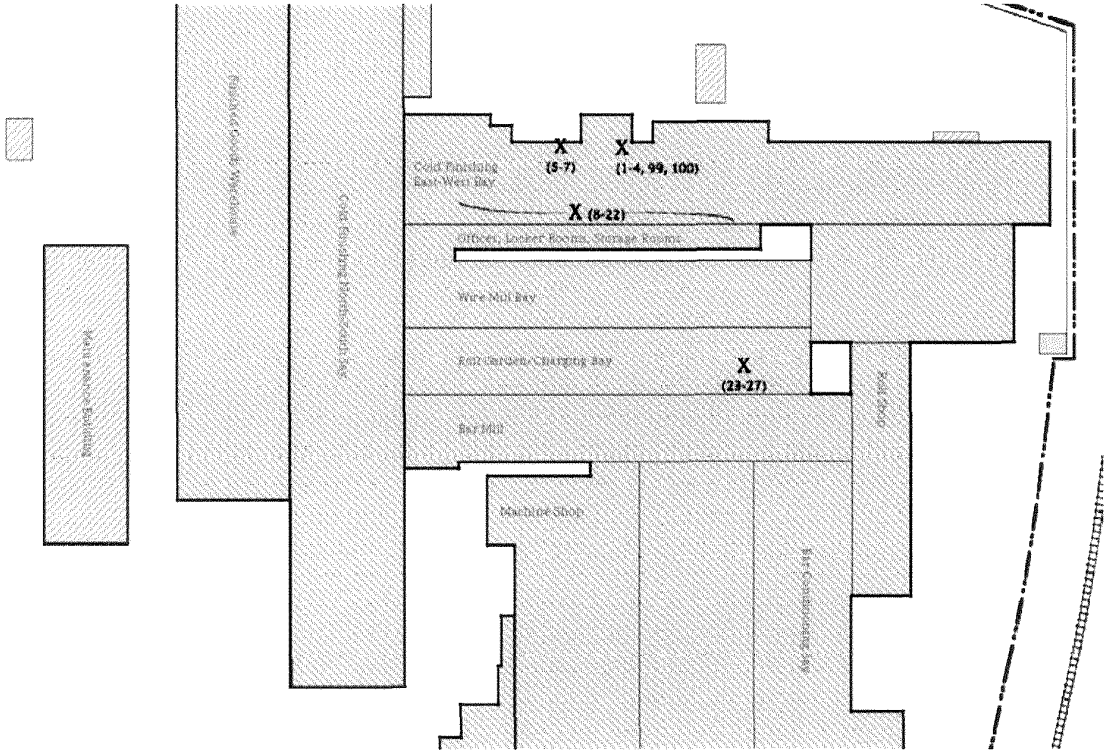
Figure 3. Direct Instrument Survey Locations



Removable activity was measured by collecting wipe samples from areas where alpha and beta measurements were elevated. The wipe samples were counted in a Nuclear Chicago Model 1152 gas flow

internal proportional planchette counting system. Wipe sample analysis results are quantitative and are reported in dpm/100 cm^2. Wipe sample locations are in Figure 4.

Figure 4. Wipe Sample Locations



INSTRUMENTATION

Direct Instrument Surveys

The Ludlum Model 3 is a general-purpose portable survey instrument. It is used with a Ludlum Model 44-9 pancake type Geiger-Mueller (GM) detector. The Model 44-9 is sensitive to charged particle radiation, such as alpha and beta radiation, and has limited sensitivity to photons. Cpm readings using this probe are qualitative. These measurements become quantitative when the source of the radiation is known.

The Ludlum Model 16 is a general-purpose portable survey instrument and analyzer. It has adjustable high voltage, an adjustable threshold and an adjustable window. It is used with a Ludlum Model 43-5 alpha scintillation detector. The model 43-5 has a silver

doped zinc sulfide (ZnS(Ag)) alpha scintillator to detect alpha emitting radionuclides on surfaces while rejecting photon background radiation. The measurements performed using this instrument are quantitative and are reported in dpm/100cm^2.

The Ludlum Model 193 is a general-purpose portable survey instrument with a fixed alarm point and a quick deviation alarm that is based on background radiation levels. The quick deviation alarm enables detection of subtle changes in radiation levels. The Model 193 is used with a Ludlum Model 44-10 or an Eberline PG-2 gamma scintillation detector.

The Model 44-10 is a 2" X 2" thallium doped sodium iodide gamma scintillator that responds to photons. The Eberline PG-2 is a 2" x 2 mm scintillator that responds well to the low energy photons emitted by the early radionuclides in the uranium series, shown in Appendix C. The measurements performed using these instruments are quantitative.

Downhole Survey

The Ludlum model 2200 is a scaler, ratemeter and single channel analyzer. It has an adjustable timer, adjustable high voltage, threshold and window. It is used with various detectors including a Ludlum Model 44-10 gamma scintillation detector or a Health Physics Instruments Model 5530 thallium doped sodium iodide (NaI(Tl)) gamma scintillator. The measurements performed using this instrument and detector combination are qualitative.

The Health Physics Instruments Model 5530 probe has a similar 1" X 1" thallium doped sodium iodide (NaI(Tl)) gamma scintillator and is used in smaller diameter boreholes.

Internal Planchette Counter

The Nuclear Chicago Model 1152 is a gas flow internal proportional planchette counting system with an automatic sample changer. Anti-coincidence and graded shielding minimize background. The Model 1152 has alpha and beta/gamma discrimination and measures alpha emitting radionuclides and beta emitting radionuclides in samples. Alpha measurements are quantitative and are reported in dpm. Beta measurements are quantitative and reported in dpm if the radionuclide identity is known.

High Resolution Gamma Spectroscopy

The Nucleus PCA II analyzer is a PC based 8k-channel multi channel analyzer (MCA). It is used with an Ortec GEM-30185 high purity germanium (HPGe) detector, an Ortec 456 high voltage power supply, and a Canberra Model 2021 spectroscopy amplifier. Data are reduced using Quantum Technology gamma spectroscopy software. This system performs qualitative and quantitative analysis of spectra from the High Purity Germanium (HPGe) detector, identifying radionuclides and measuring the quantities present in bulk samples.

Neither of the principal isotopes of uranium has a significant gamma associated with its decay and uranium concentrations were measured using surrogates. Protactinium-234m is a surrogate for U-238 and thorium-231 is a surrogate for U-235.

RESULTS

Direct Instrument Surveys

Radiation levels were elevated at locations in the Processing Building. The results are in Table 2. No elevated radiation levels were detected in other focused survey areas.

Table 2. Direct Survey Measurements

Area	Gamma (cpm)	Beta (dpm / 100 cm^2)[b]	Alpha (dpm / 100 cm^2)
Instrument Background[a]	3,000-5,000	3700	11
A - floor and pipe	20,000	1,111,000	1,645
B - threshold	80,000	-	2,632
B - floor	10,000-20,000	-	-
C - wall	15,000	667,000	1,096
D - floor	20,000	-	-
E - wall	6,000-8,000	370,000	1,096

[a] Instrument background is the electronic background plus the response to ambient radiation.
[b] The beta efficiency for Th-234 is used.

Removable Contamination Wipe Samples

Wipe samples indicate that removable surface contamination was present. Results for all collected wipe samples are in Table 3.

Table 3. Removable Contamination Wipe Samples

Wipe	Description	Beta (dpm / 100 cm^2)	Alpha (dpm / 100 cm^2)
	Minimum Detectable Activity (MDA)	6.5	2.7
99	Floor	16.5	3.3
100	Air hose	49.5	23.8
1	Inside an open hole	40.2	24.3
2	Brick wall	< 6.5	< 2.7
3	Wall (wood, etc.)	< 6.5	< 2.7
4	Inside of pipe containing rag	550.9	206.6
5	Floor	78.8	31.2
6	Threshold of a door	212.8	95.4
7	Floor west of the door	10.5	< 2.7
15	Wall and pipe	< 6.5	< 2.7
21	Wall	< 6.5	< 2.7
22	Floor	< 6.5	< 2.7
8	South wall and floor	< 6.5	< 2.7
9	"	< 6.5	< 2.7
10	"	< 6.5	< 2.7
11	"	< 6.5	< 2.7
12	"	< 6.5	< 2.7
13	"	< 6.5	< 2.7
14	"	47.7	19.6
16	"	< 6.5	< 2.7
17	"	< 6.5	< 2.7
18	"	< 6.5	< 2.7
19	"	< 6.5	< 2.7
20	"	10.5	5.2
23	Roof trusses	< 6.5	< 2.7
24	"	< 6.5	< 2.7
25	"	< 6.5	< 2.7
26	"	< 6.5	< 2.7
27	Exhaust	< 6.5	< 2.7
28	Roof trusses	< 6.5	< 2.7

Borehole Measurements and Borehole samples

The borehole radiation levels in the suspected burn area were elevated at depths between 3 feet and 10 feet. Slightly elevated concentrations of U-235 and U-238 in equilibrium with their daughters were detected in samples collected at the depths of elevated readings. Uranium metal would have been separated from its

daughters and only the short-lived daughters of U-235 and U-238 could have grown-in in the period since the uranium was handled. No indication of elevated U-235 or U-238 concentrations in excess of their long-lived daughters was detected in the boreholes in the suspected burn area.

The radiation levels in boreholes in the Processing Building were elevated at depths between 4 feet and 9 feet. Samples collected at the depths of elevated readings in these boreholes had concentrations of U-235 and U-238 in equilibrium with their long-lived daughters. This equilibrium indicates that elevated readings are not likely to be from uranium metal separated from its daughters. A sample collected from borehole D, that had collapsed before downhole measurements could be made, had elevated concentrations of the short-lived U-235 and U-238 daughters in the absence of the long-lived daughters. This sample had approximately 2 pCi/g of U-235 and 74 pCi/g of U-238. The occurrence U-235, U-238 and their short-lived daughters would result from the processing of uranium metal. The long-lived daughters were not present. Borehole results are in Table 4. High-resolution gamma spectroscopy summary results are in Table 5. Complete gamma spectroscopy results are in Appendix D.

Table 4. Borehole Count Rates (cpm)

Depth (ft)	P-1	P-2	P-3	P-4	P-5	A	B	C
Background	2467	2467	2467	2467	2467	3820	4210	5730
0	3658	3290	3746	3050	4154	4620	4820	6560
1	8115	3182	4356	3966	4463	6080	8920	4940
2	9115	6318	8991	5126	8291	7550	11560	2230
3	**15118**	7864	11738	8147	7680	8030	10360	6740
4	**16281**	10414	8834	10235	6745	11650	18300	**16720**
5	**14302**	**12682**	14208	12961	13028	**20710**	**20900**	**21450**
6	**13359**	**13831**	**15173**	**13782**	**14813**	**18790**	**21110**	**19850**
7	12747	**14302**	**14627**	**14363**	**15028**	**18890**	**19920**	**19050**
8	13160	**14026**	**15102**	**14470**	**14428**	18930	18710	**19070**
9	12806	13204	**14241**	13762	**13913**	18520	15680	19360
10	10559	9681	**10864**	10412	**12792**	15510	14130	14570

Background was measured with the instrument probe on the ground before holes were bored. Samples were collected from bolded depths.

Table 5. Borehole Sample Concentrations of U-235 and U-238

Hole (depth)	U-235 pCi/g	U-238 pCi/g	Total pCi/g
P-1 (3'-6')	0.00E+00	3.07E+00	3.07E+00
P-2 (5'-8')	0.00E+00	2.43E+00	2.43E+00

P-3 (6′-8′)	0.00E+00	3.75E+00	3.75E+00
P-3 (8′-10′)	0.00E+00	2.12E+00	2.12E+00
P-4 (6′-8′)	0.00E+00	2.66E+00	2.66E+00
P-5 (6′-10′)	0.00E+00	6.22E+00	6.22E+00
A (5′-7′)	0.00E+00	2.45E+00	2.45E+00
B (5′-7′)	6.79E-01	6.49E+00	7.17E+00
C (4′-8′)	0.00E+00	2.80E+00	2.80E+00
D (4′-8′)	2.07E+00	7.35E+01	7.56E+01

0.00+00 is the reported result when the specified radionuclide is not detected by the gamma data reduction software.

Bulk Samples

Elevated gamma radiation levels, suggesting significant contamination, were found in a rag stuffed into a pipe in the Processing Building at, on the wall surfaces at location A, on the south side of the Processing Building, and in debris from cracks in a concrete stoop of a doorway leading to the outside at location B. The doorway is in the north wall of the Processing Building. The rag contained 8.8 pCi/g of U-235 and 167 pCi/g of U-238. The sample collected from the wall on the south side of the Processing Building contained 300 pCi/g of U-235 and 6,120 pCi/g of U-238. The sample collected from the cracks in the concrete stoop at location A contained 672 pCi/g of U-235 and 17,200 pCi/g of U-238.

These bulk samples contained U-235, U-238, and the short-lived daughters associated with the processing of uranium metal. The long-lived daughters were not present.

Table 6. Bulk sample results

Bulk sample	U-235 pCi/g	U-238 pCi/g	Total U pCi/g
A (Rag)	8.80E+00	1.67E+02	1.76E+02
B (cloth)	1.02E+03	1.65E+04	1.75E+04
B (debris and soil)	6.72E+02	1.72E+04	1.79E+04
C (wall)	3.00E+02	6.12E+03	6.42E+03

CONCLUSIONS

From the results of these surveys it is apparent that contamination exists on the Joslyn site. The surface contamination known to be present is in excess of the following acceptable alpha and beta

surface contamination limits adapted from USNRC Regulatory Guide 1.86.

Nuclide	Average [a]	Maximum [b]	Removable
U-Nat and beta emitters	5,000 dpm /100cm^2	15,000 dpm /100cm^2	1,000 dpm /100cm^2

[a] Measurements of average contaminant should not be averaged over more than one square meter. For objects of less surface area, the average should be derived for each such object.

[b] The maximum contamination level applies to an area of not more than 100 cm^2.

Attenuation by soil, concrete, debris, oil, or other material may be masking additional significant contamination. Removable contamination results may be low because much of the contamination has become fixed by paint and other surface coatings.

Regulatory Guide 1.86 is no longer current, having been replaced by more complex, and more restrictive modeling. Risk based cleanup standards now in use require more information than is currently available. The information that would be used in modeling includes pathways resulting from possible use of the Joslyn site into the distant future.

The extent of the contamination is still unknown and will require a comprehensive characterization to perform a realistic assessment of the site. The assessment should include a comprehensive survey of buildings and evaluations of potential soil contamination beneath and outside the buildings.

Appendix A

University of Chicago Contract
with
Joslyn Manufacturing and Supply Company

August 15, 1943

Joslyn

~~SECRET~~

MUC WCM-57.
This document consists of 7 pages and ..... figures
No. 5 of 10 copies, Series A

SERVICE
CONTRACT NO. 7401 - 37 - 9

This subcontract entered into this 15th day of August, 1943, by and between the University of Chicago, a corporation not for pecuniary profit organized under the laws of the State of Illinois, of Chicago, Illinois (hereinafter called the "Contractor") and Joslyn Manufacturing & Supply Company a Corporation organized under the laws of the State of Illinois, of Chicago, Illinois (hereinafter called the "Subcontractor").

WHEREAS, the Contractor has heretofore entered into a contract with the United States of America (represented by its duly designated contracting officer) under contract designated as No. W-7401 - Eng. 57 and supplements thereto to perform certain work as therein specified; and

WHEREAS, the Contractor desires the Subcontractor to furnish certain services, said services being within the scope of the aforesaid contract,

NOW, THEREFORE, the parties hereto agree as follows:

OFFER: Confirming negotiations, the Subcontractor agrees to furnish the services as listed below at the rates and terms specified, and in accordance with the conditions on the continuation sheets attached hereto: Consisting of five (5) pages containing Articles I to XXII inclusive:

To perform centerless grinding operations on rods and tubes to be furnished by the Contractor, together with those operations that may be preliminary and supplementary thereto, such as straightening, centerless turning, pickling, etc., at the rate of twelve dollars ($12.00) per hour which rate is all inclusive of facilities, supplies, labor and supervision supplied by the Subcontractor. Any materials supplied by the Contractor are to be transported to and returned from the Subcontractor's plant at the Contractor's expense.

Classification Cancelled
~~Or Changed To~~ _____
By Authority Of OoC
By [redacted]
Date 5-14-85

The rates and terms specified above will constitute full compensation to the Subcontractor for all work and services to be performed hereunder, except for additional compensation to which the Subcontractor may be entitled under Article XXII hereof.

This document contains information affecting the National defense of the United States within the meaning of the Espionage Act, U. S. C. 50; 31 and 32. Its transmission or the revelation of its contents in any manner to

SECRET

SSC

Subcontractor: Joslyn Mfg. and Supply Co.

Address: 3700 S. Morgan St., Chicago, Ill.

By: [redacted]

Title: Vice-President

I, [redacted], certify that I am the Secretary of the Joslyn Mfg. and Supply Co. named as the Subcontractor herein; that [redacted] who signed this subcontract on behalf of the Subcontractor was then Vice-President of said Corporation; that said subcontract was duly signed for and on behalf of said corporation by authority of its governing body and is within the scope of its corporate powers.

(Seal) [redacted]

ACCEPTANCE: The Contractor hereby accepts the offer of the Subcontractor hereinabove set forth.

Contractor: The University of Chicago

Address: 5750 Ellis Avenue
Chicago, Illinois

By: [redacted]

Title: Business Manager

APPROVED: [redacted]

Name:

Title: [redacted]
Authorized Representative
of the Contracting Officer.

SSC

CONDITIONS ATTACHED TO AND FORMING A PART OF SERVICE CONTRACT BETWEEN THE UNIVERSITY OF CHICAGO AND Joslyn Manufacturing & Supply Company

of Chicago, Illinois

DATED August 15, 1943

ARTICLE I. PAYMENTS

The Subcontractor shall be paid at the end of each calendar month, or as soon thereafter as practicable at the rates stipulated herein for services rendered, less deductions, if any, as herein provided, upon the submission of properly certified and correct invoices or vouchers prepared in quintuplicate, and bearing code description number of this sub-contract (7401-37 - 9).

ARTICLE II. COMPLETION OF WORK

The Subcontractor shall proceed with the services herein provided for until December 31, 1943, or until such later date as may be authorized in writing by the Contractor and agreed to by the Subcontractor, such completion date in no event, however, to extend beyond the date of termination of prime contract No. W-7401-eng. 37.

ARTICLE III. PATENTS - deleted

It is understood and agreed that whenever any discovery or invention believed to be new is made by the Subcontractor or its employees in the course of the services called for in this subcontract, the Subcontractor agrees to keep witnessed and dated written records of all such discoveries and inventions and shall promptly furnish the Contractor with complete information thereon and the Contractor shall have the sole power to determine whether or not a patent application shall be filed and to determine the disposition of the title to and the assignment of rights under any application or patent that may result. It is further understood and agreed that the judgment of the Contractor in such matters shall be accepted as final, and the Subcontractor for itself and for its employees agrees that the inventor or inventors will execute all documents and do all things necessary or proper to carry out the judgment of the Contractor. The Subcontractor agrees it will include the provisions of this paragraph in all contracts of employment with persons who do any part of the services called for in this subcontract. Any patent applications filed on such discoveries or inventions shall be prepared and prosecuted without expense to the Subcontractor.

ARTICLE IV. ASSIGNMENT OF RIGHTS HEREUNDER

Neither this Subcontract nor any interest therein or claim thereunder shall be assigned or transferred by the Subcontractor to any other party or parties.

ARTICLE V. SAFEGUARD OF INFORMATION

It is understood that disclosure by the Subcontractor or its employees of information relating to the services contracted for hereunder to any person not entitled to receive it, or failure to safeguard all secret, confidential and restricted matter that may come to the Subcontractor or any person under its control in connection with the subject services under this subcontract, may subject the Subcontractor, its agents, employees and subcontractors to criminal liability under the laws of the United States. (See Title I of an Act approved June 15, 1917, 40 Stat. 217; 50 U.S.C. 30-42), as amended by an Act approved March 23, 1940,

ARTICLE V. Cont'....
(54 Stat. Chap. 72); and the provisions of an Act approved January 12, 1938 (52 Stat. 3; 50 U.S.C., Supp. V 45-45d) as supplemented by Executive Order No. 8381, dated March 22, 1940, 5 F.R. 1147 D. I.

ARTICLE VI. ESPIONAGE OR SABOTAGE
The Subcontractor shall immediately submit a confidential report to the Contractor whenever for any cause it has reason to believe that there is an active danger of espionage or sabotage affecting any of the work hereunder.

ARTICLE VII. EMPLOYMENT OF ALIENS
The Subcontractor shall not employ any alien on or permit any alien to have access to the plans, specifications, or services hereunder without the written consent of the Contractor as to each such alien.

ARTICLE VIII. EMPLOYEE ORIGIN
The Subcontractor, whenever requested by the Contractor, shall report to the Contractor the citizenship, country of birth, or alien status of any or all of its employees at the site of, or having access to, any of the services hereunder.

ARTICLE IX. EXCLUSION OF UNDESIRABLES
The Subcontractor shall not employ, or continue the employment of, any person or persons designated by the Contractor as undesirable to have access to the premises where the services of the Subcontractor are being performed hereunder, and the Subcontractor shall exclude any person or persons so designated by the Contractor from such premises.

ARTICLE X. PROPERTY ACQUIRED AND USED
In the event the rate or charges specified herein to be paid to the Subcontractor include an allowance for property to be especially acquired for the carrying out of the services herein provided for, title to all such property shall vest in the Contractor. Also, title to all materials, supplies, apparatus, equipment, or other property which may be furnished by the Contractor to the Subcontractor hereunder to facilitate the carrying out of the services herein provided for shall remain in the Contractor and all such property, etc., shall be used by the Subcontractor only for the purposes approved by the Contractor.

ARTICLE XI. VISIT, INSPECTION, AND REPORT OF PROGRESS

a. The Subcontractor whenever requested shall permit an authorized representative of the Contractor to visit the site of the work at all reasonable hours and inspect the Subcontractor's performance hereunder.

b. In the event the services being performed by the Subcontractor hereunder are found to be deficient, or otherwise not in conformity with specifications, requirements, and/or instructions as negotiated hereunder, the Contractor shall have the right to reject such services or require their correction without additional cost to it.

c. The Subcontractor shall report the progress of performance hereunder from

ARTICLE XI. Cont'.....

time to time as requested by the Contractor; and shall furnish a complete report of its findings and conclusions upon completion of its undertakings herein. Such report shall be furnished in such quantities and form as may be required by the Contractor.

ARTICLE XII. DATA REGARDING PERFORMANCE

a. All drawings, designs, specifications, data and memoranda of every description relating to the services or any part thereof are to become the property of the Contractor upon completion thereof, subject to the right of the Subcontractor to retain duplicates thereof for use as records only, and the Contractor shall have full right to use said drawings, designs, specifications, data and memoranda in any manner when and where the Contractor may designate without any claim on the part of the Subcontractor for additional compensation. A complete list of the duplicates of classified records retained by the Subcontractor shall be furnished to the Contractor.

b. All drawings, designs, specifications, data and memoranda of every description concerning the subject services shall be delivered to the Contractor when requested by the Contractor; and, furthermore, access to such drawings, designs, specifications, data and memoranda as may contain classified information shall be restricted to trusted and duly authorized representatives of the Contractor and the Subcontractor, except as otherwise specifically authorized in writing by the Contractor.

ARTICLE XIII. INSURANCE

The Subcontractor shall take out and maintain the following insurance during the period of this contract, at his own cost and expense:

a. Public Liability Insurance - insuring the Contractor and the Subcontractor, and the Board of Trustees of the Contractor, individually and collectively, written by a company approved by the Contractor in amounts of $None to $None

b. Workmen's Compensation Insurance, with occupational Diseases endorsement, written by a company approved by the Contractor in unlimited amount for the protection of the Subcontractor against claims under the Workmen's Compensation and Occupational Diseases Acts of the State of Indiana.

ARTICLE XIII, Cont'.....

Before undertaking any work hereunder the Subcontractor will cause to be delivered to the Contractor certificates of the insurance companies as to the particulars of the insurance hereinabove referred to, which certificates shall contain a provision that such insurance will not be canceled by lapse of time or otherwise except upon five (5) days prior written notice to the Contractor, sent by United States Registered Mail, postage prepaid, addressed to the Contractor, attention of W. B. Harrell, Business Manager, 956 E. 58th St., Chicago, Illinois.

ARTICLE XIV. EIGHT-HOUR LAW

The Subcontractor shall compensate laborers and mechanics for all hours worked by them hereunder in excess of eight (8) hours in any one calendar day at a rate not less than one and one-half times the basic rate of pay of such laborers and mechanics.

ARTICLE XV. ANTI-DISCRIMINATION

The Subcontractor shall not discriminate in any act performed hereunder against any citizen on the ground of race, creed, color or national origin.

ARTICLE XVI. CONVICT LABOR

The Subcontractor shall not employ any person undergoing sentence or imprisonment at hard labor.

ARTICLE XVII. OFFICIALS NOT TO BENEFIT

No member of or delegate to Congress, or resident commissioner shall be admitted to any share or part of this subcontract or any benefit that may arise therefrom, but this provision shall not be construed to extend to this subcontract if made with a corporation for its general benefit.

ARTICLE XVIII. COVENANT AGAINST CONTINGENT FEES

The Subcontractor warrants that it has not employed any person to solicit or secure this subcontract upon any agreement for a commission, percentage, brokerage or contingent fee. Breach of this warranty shall give the Contractor the right to annul the subcontract, or, in its discretion, to deduct from the contract price or consideration the amount of such commission, percentage, brokerage or contingent fee. This warranty shall not apply to commissions payable by the Subcontractor upon contracts of sale secured or made through bona fide established commercial or selling agencies maintained by the Subcontractor for the purpose of securing business.

ARTICLE XIX. CHANGES

The Contractor may from time to time by written orders transmitted to the Subcontractor change the extent or amount of the services covered by this agreement.

ARTICLE XIX. Cont'....
If any of such changes cause material increases or decreases in the amount or character of the services to be rendered by the Subcontractor hereunder, the contract price herein provided for shall be increased or decreased accordingly and amendment to this agreement executed covering same.

ARTICLE XX. DISPUTES - deleted
~~All disputes concerning questions of fact arising under this subcontract which are not disposed of by mutual agreement shall be decided by the Contracting Officer under the prime contract, whose decision in writing shall be final and conclusive.~~

ARTICLE XXI. RELATION TO PRIME CONTRACT
It is understood that this is a subcontract under the prime contract hereinabove referred to, and by reason thereof subject to all the terms, conditions and limitations imposed by such prime contract, including the condition that the effectiveness of this subcontract is subject to the prior written approval of the contracting officer in said prime contract or his duly authorized representative. Inasmuch as the prime contract is a secret contract and the terms thereof have not been revealed to the Subcontractor, it is expressly understood and agreed by the parties hereto that this Article does not obligate the Subcontractor financially or in accountability for property, materials, supplies, or services to an extent beyond what is specifically made the obligation of the Subcontractor in this subcontract.

ARTICLE XXII. ALTERATIONS
The following changes were made in this subcontract before it was signed by the parties hereto:

a. Due to the peculiar characteristics of the metal subject to the operations to be performed by the Subcontractor hereunder, unpredictable damage or breakage may result to machines used. The contractor agrees to reimburse the Subcontractor in an amount not to exceed two thousand ($2,000) dollars for such damage or breakage on the presentation of evidence satisfactory to the Contractor that such damage or breakage occured during the course of services being performed by the Subcontractor hereunder and also that precautionary measures were taken so that the loss that occured was beyond the control of the Subcontractor. It is further understood and agreed that in the event such damage or breakage occurs to the extent of two thousand ($2,000) dollars, the services to be performed hereunder are not to be resumed until a new subcontract is agreed on and executed.

b. Articles III and IX were deleted.

This document consists of 1 pages and 1 figures No. 1 of 16 copies, Series A

~~SECRET~~

METALLURGICAL PROJECT FORM MP-29
THE UNIVERSITY OF CHICAGO
CHICAGO, ILLINOIS

30 December 1943
DATE

AGREEMENT NO. 1 FOR THE

EXTENSION OF Service SUBCONTRACT # 7401-37-9 DATED 15 August 1943

BY AND BETWEEN

THE UNIVERSITY OF CHICAGO, OF CHICAGO, ILLINOIS AS "THE CONTRACTOR"

AND Joslyn Mfg. & Supply Co.

OF 3700 South Morgan Street, Chicago, Illinois AS "THE SUBCONTRACTOR."

Joslyn Mfg. & Supply Co. (for the attention of A. J. Blaeser, Vice President)
3700 South Morgan Street
Chicago, Illinois

DEAR SIRS:

1. UNDER AND BY VIRTUE OF ARTICLE II OF THE ABOVE-DESCRIBED SUBCONTRACT # 7401-37-9 THE UNIVERSITY OF CHICAGO, AS CONTRACTOR, HEREBY AUTHORIZES AND REQUESTS Joslyn Mfg. & Supply Co., AS SUBCONTRACTOR, TO EXTEND CERTAIN PROVISIONS OF SAID SUBCONTRACT AS FOLLOWS:

   A. WORK (as offered and accepted) To continue to perform centerless grinding operations on rods and tubes to be furnished by the Contractor, plus preliminary and supplementary operations thereto.

   B. CONTRACT PERIOD (Article II) To proceed with the said work as requested by the Contractor until June 30, 1944, or until such later date as may be authroized in writing by the Contractor and agreed to by the Subcontractor.

   PROVIDED, HOWEVER, THAT IN NO EVENT SHALL THIS AFORESAID EXTENDED TERMINATION DATE EXTEND BEYOND THE DATE OF TERMINATION OF THE CONTRACTOR'S PRIME CONTRACT NO. W 7401- ENG. 37, AND SUPPLEMENTS THERETO.

   C. LIMITATION UPON COSTS The Subcontractor to be reimbursed at the rate of $12.00 per hour as provided in Subcontract #7401-37-9, for its performance of the said work hereunder, provided the total obligation of the Contractor hereunder during the aforesaid period of extension shall not exceed the sum of $5000.00 unless the Contractor specifically consents in writing thereto.

   D. OTHER: None

2. OTHERWISE, ALL OTHER TERMS, PROVISIONS, AND/OR CONDITIONS OF SAID SUBCONTRACT ARE TO CONTINUE IN FULL FORCE AND EFFECT.

THE UNIVERSITY OF CHICAGO

BY: [redacted]
BUSINESS MANAGER [redacted]

3. WE (I) HEREBY AGREE TO THE EXTENSION OF THE AFORESAID SUBCONTRACT # 7401-37-9 AS DESCRIBED IN PARAGRAPHS #1 AND #2 HEREINABOVE.

JOSLYN MFG. AND SUPPLY CO.

BY: [redacted]
TITLE: Vice-President.

DATED AT Chicago, Illinois THIS 8th DAY OF January 194 4.

4. APPROVED: [redacted] E.
[redacted] thorized Representative
the Contr[redacted]

~~SECRET~~

Classification Cancelled
~~Or Changed To~~
By Authority Of DoC
By [redacted] Date 5-14-

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No. 5 of 10 copies, Series A
MARCH 10, 1944
DATE

METALLURGICAL PROJECT FORM MP-29
THE UNIVERSITY OF CHICAGO
CHICAGO, ILLINOIS

AGREEMENT NO. 2 FOR THE

EXTENSION OF SERVICE SUBCONTRACT # 7401-37-9 DATED AUGUST 15, 1944

BY AND BETWEEN

THE UNIVERSITY OF CHICAGO, OF CHICAGO, ILLINOIS AS "THE CONTRACTOR"

AND JOSLYN MANUFACTURING AND SUPPLY COMPANY

OF 3700 SOUTH MORGAN ST., CHICAGO, ILL. AS "THE SUBCONTRACTOR."

JOSLYN MFG. & SUPPLY CO.
3700 SOUTH MORGAN ST.
CHICAGO, ILLINOIS

Classification Cancelled
~~Or Changed To~~
By Authority Of DoC
By [redacted] Date 5-14-85

DEAR SIRS:

1. UNDER AND BY VIRTUE OF ARTICLE III OF THE ABOVE-DESCRIBED SUBCONTRACT # 7401-37-9 UPON THE CONSIDERATIONS THEREIN EXPRESSED THE UNIVERSITY OF CHICAGO, AS CONTRACTOR, HEREBY AUTHORIZES AND REQUESTS JOSLYN MFG. & SUPPLY CO., AS SUBCONTRACTOR, TO EXTEND CERTAIN PROVISIONS OF SAID SUBCONTRACT AS FOLLOWS:

   A. WORK (NO CHANGE)

   B. CONTRACT PERIOD (NO CHANGE)

   PROVIDED, HOWEVER, THAT IN NO EVENT SHALL THIS AFORESAID EXTENDED TERMINATION DATE EXTEND BEYOND THE DATE OF TERMINATION OF THE CONTRACTOR'S PRIME CONTRACT NO. W 7401- ENG. 37, AND SUPPLEMENTS THERETO.

   C. LIMITATION UPON COSTS (SUBCONTRACTOR WILL BE PAID AT THE RATE OF $12.00 PER HOUR FOR SERVICES AS PROVIDED IN SUBJECT CONTRACT; PROVIDED, THE TOTAL OBLIGATION OF THE CONTRACTOR UNDER EXTENSION AGREEMENTS #1 AND #2 DOES NOT EXCEED $10,000.00; I.E., AN ADDITIONAL $5,000.00 IS FURTHER AUTHORIZED BY THIS EXTENSION.

   D. OTHER:

   (NONE)

2. OTHERWISE, ALL OTHER TERMS, PROVISIONS, AND/OR CONDITIONS OF SAID SUBCONTRACT ARE TO CONTINUE IN FULL FORCE AND EFFECT.

THE UNIVERSITY OF CHICAGO

BY: [redacted] (SEAL)
BUSINESS MANAGER [redacted]

3. WE (I) HEREBY AGREE TO THE EXTENSION OF THE AFORESAID SUBCONTRACT # 7401-37-9 AS DESCRIBED IN PARAGRAPHS #1 AND #2 HEREINABOVE.

JOSLYN MFG. & SUPPLY COMPANY

BY: [redacted]

TITLE: Vice-President

DATED AT CHICAGO, ILLINOIS THIS 17th DAY OF April 194 4.

4. APPROVED:

[redacted]
CONTRACTING OFFICER

[redacted]
Authorized Representative

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UNIVERSITY OF CHICAGO
CHICAGO, ILLINOIS

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No. 5 of 10 copies, Series A
AGREEMENT NO. 3 FOR THE

June 30, 1944
DATE

EXTENSION OF Service SUBCONTRACT # 7401-37-9 DATED August 15, 1943

BY AND BETWEEN

THE UNIVERSITY OF CHICAGO, OF CHICAGO, ILLINOIS AS "THE CONTRACTOR"

AND Joslyn Manufacturing and Supply Company

OF Chicago, Illinois AS "THE SUBCONTRACTOR."

Joslyn Manufacturing and Supply Company
3700 South Morgan Street
Chicago, Illinois

Attention: Mr. A. J. Blaeser
Vice President

DEAR SIRS:

1. UNDER AND BY VIRTUE OF ARTICLE II OF THE ABOVE-DESCRIBED SUBCONTRACT # 7401-37-9 and UPON THE CONSIDERATIONS THEREIN EXPRESSED THE UNIVERSITY OF CHICAGO, AS CONTRACTOR, HEREBY AUTHORIZES AND REQUESTS Joslyn Manufacturing and Supply Company, AS SUBCONTRACTOR, TO EXTEND CERTAIN PROVISIONS OF SAID SUBCONTRACT AS FOLLOWS:

   A. WORK (as offered and accepted) no change

   B. CONTRACT PERIOD (Article II) from a termination date of June 30, 1944, to a termination date of December 31, 1944
   PROVIDED, HOWEVER, THAT IN NO EVENT SHALL THIS AFORESAID EXTENDED TERMINATION DATE EXTEND BEYOND THE DATE OF TERMINATION OF THE CONTRACTOR'S PRIME CONTRACT NO. W-7401-ENG. 37, AND SUPPLEMENTS THERETO.

   C. LIMITATION UPON COSTS (The subcontractor to be reimbursed as provided in subcontra #7401-37-9 for its performance of the work hereunder, provided the total obligat of the contractor under extension agreements #1, #2, and #3 shall not exceed the sum of $20,000.00 unless the contractor specifically consents in writing thereto.

   D. OTHER: None

2. OTHERWISE, ALL OTHER TERMS, PROVISIONS, AND/OR CONDITIONS OF SAID SUBCONTRACT ARE TO CONTINUE IN FULL FORCE AND EFFECT.

WITNESSES (two):
[redacted]

THE UNIVERSITY OF CHICAGO
BY: [redacted]
BUSINESS MANAGER [redacted]

3. WE (I) HEREBY AGREE TO THE EXTENSION OF THE AFORESAID SUBCONTRACT # 7401-37-9 AS DESCRIBED IN PARAGRAPHS #1 AND #2 HEREINABOVE.

WITNESSES(two):
[redacted]

Joslyn Manufacturing and Supply Company
BY: [redacted]
TITLE: Vice-Pres.

DATED AT Chicago, Illinois THIS 11th DAY OF July 1944.

4. APPROVED:

[redacted]
CONTRACTING OFFICER

[redacted]
Authorized Representative of the Contracting Officer

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By Authority of DoC
By [redacted] Date 5-14-85

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MUC-SC-1137
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Metallurgical Project Form MP-29
The University of Chicago
Chicago, Illinois

Contract #7401-37-9
November 30, 1944
date

Agreement No. 4 for the

Extension of Service Subcontract # 7401-37-9 dated August 18, 1942

By and between

The University of Chicago, of Chicago, Illinois as "The Contractor"

and Joslyn Manufacturing and Supply Company

of Chicago, Illinois as the "Subcontractor."

Joslyn Manufacturing & Supply Co.
3700 South Morgan Street
Chicago, Illinois

Attention: Mr. A. J. Blaeser, Vice President

Dear Sirs;

1. Under and by virtue of Article II of the above-described Subcontract NO. 7401-37-9, and upon the considerations therein expressed The University of Chicago, as Contractor, hereby authorizes and requests Joslyn Manufacturing and Supply Company, as Subcontractor, to extend certain provisions of said Subcontract as follows:

   A. Work (No change)

   B. Contract Period (Article II) from a termination date of December 31, 1944, to a termination date of June 30, 1945.

   Provided, however, that in no event shall this aforesaid extended termination date extend beyond the date of termination of the Contractor's prime contract No. W-7401-Eng.37, and supplements thereto.

   C. Limitation upon costs (The Subcontractor to be reimbursed as provided in subcontract #7401-37-9 for its performance of the work hereunder provided the total obligation of the Contractor under extension agreements #1, #2, #3 and #4 shall not exceed the sum of #30,000.00 unless the Contractor specifically consents in writing thereto.

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By Authority Of OoC
By [redacted] Date 5-14-85

10-26-44

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D. Other: None

2. Otherwise, all other terms, provisions, and/or conditions of said Subcontract are to continue in full force and effect.

Witnessed:

[redacted]
Name

Chicago
Address

Illinois
[redacted], Chicago, Illinois

THE UNIVERSITY OF CHICAGO

By [redacted] (Seal)
Business Manager

3. We (I) hereby agree to the extension of the aforesaid Subcontract #7401-37-8 as described in paragraphs #1 and #2 hereinabove.

Joslyn Manufacturing and Supply Company

Witnessed:

[redacted]
Address

Oak Park, Ill
[redacted], Oak Park, Illinois

By [redacted]

Title V. P.

Dated at Chicago, Illinois this 21st day of December 1944

4. Approved:

[redacted]
Contracting Officer

[redacted]
Authorized Representative of the Contracting Officer

10-26-44

MUC-SE-1172
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Metallurgical Project Form MP-29
The University of Chicago
Chicago, Illinois

Contract #7401-37-9

June 13, 1945
date

Agreement No. 5 for the

Extension of Service Subcontract # 7401-37-9 dated August 15, 1943

By and between

The University of Chicago, of Chicago, Illinois as "The Contractor"

and Joslyn Manufacturing and Supply Company

of Chicago, Illinois as the "Subcontractor."

Joslyn Manufacturing & Supply Co.
3700 South Morgan Street
Chicago, Illinois

Attn: [redacted], Vice President

Dear Sirs;

1. Under and by virtue of Article II of the above-described Subcontract NO. 7401-37-9, and upon the considerations therein expressed The University of Chicago, as Contractor, hereby authorizes and requests Joslyn Manufacturing and Supply Company, as Subcontractor, to extend certain provisions of said Subcontract as follows:

   A. Work (No change)

   B. Contract Period (Article II) The termination date of Subcontract #7401-37-9 shall be extended from June 30, 1945 to June 30, 1946.

   Provided, however, that in no event shall this aforesaid extended termination date extend beyond the date of termination of the Contractor's prime contract No. W-7401-Eng.37, and supplements thereto.

   C. Limitation upon costs (Article I) The Subcontractor to be reimbursed as provided in Subcontract #7401-37-9 for its performance of the work hereunder provided the total obligation of the Contractor under extension agreements #1, #2, #3, #4 and #5 shall not exceed the sum of $35,000.00 unless the Contractor specifically consents in writing thereto.

Classification Cancelled
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By Authority Of OSC
By [redacted] Date 5-14-85

10-26-44

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~~SECRET~~

D. Other: The additions and changes as specified in Schedule "A" attached hereto and made a part hereof, are added to Subcontract #7401-37-9.

2. Otherwise, all other terms, provisions, and/or conditions of said Subcontract are to continue in full force and effect.

Witnessed:

[redacted]
Name

Chicago, Illinois
Address

s/ [redacted] Chicago, Illinois

THE UNIVERSITY OF CHICAGO

By [redacted] (Seal)
Business Manager

s/ [redacted]

3. We (I) hereby agree to the extension of the aforesaid Subcontract #7401-37-9 as described in paragraphs #1 and #2 hereinabove.

[redacted]

Witnessed:

[redacted]
Name

[redacted]
Address

s/ [redacted], Chicago, Illinois

By [redacted]

Title [redacted]

s/ [redacted]

Dated at CHICAGO this 3rd day of JULY 194 5

4. Approved:

[redacted]
Contracting Officer

[redacted]
Authorized Representative of the Contracting Officer.

10-26-44

Service Subcontract

Subcontract No. 7401-37- 9
Supplemental Agreement No. 5

SCHEDULE A

The following changes and additions are hereby added to Subcontract No. 7401-37- 9 and made a part thereof:

A. Article IV - ASSIGNMENT OF RIGHTS hereunder, shall be deleted in its entirety. Revised Article IV, as follows, shall be added:

Article IV - SUBLETTING - ASSIGNMENT

1. No part of this subcontract shall be sublet except with the expressed prior written approval of the Contracting Officer.

2. Neither this subcontract nor any interest therein, or claim thereunder shall be assigned or transferred by the Subcontractor to any other party or parties, except that the whole or any part thereof is assignable to the Government, provided that, in the event of such assignment to the Government, this subcontract may continue to full force and effect, notwithstanding the termination of the prime contract.

B. Article V - SAFEGUARD OF INFORMATION shall be deleted in its entirety. Revised Article V - DISCLOSURE OF INFORMATION, as follows, shall be added:

It is understood that disclosure by the Subcontractor or its employees of information relating to the services contracted for hereunder to any person not entitled to receive it, or failure to safeguard all secret, confidential and restricted matter that may come to the Subcontractor or any person under its control in connection with the subject services under this subcontract, may subject the Subcontractor, its agents, employees and Sub-subcontractors to criminal liability under the laws of the United States. (See Title 1 of an Act approved June 15, 1917, 40 Stat. 217; 50 U.S.C. 31-42), as amended by an Act approved March 28, 1940, (54 Stat. 79); and the provisions of an Act approved January 12, 1938, (52 Stat. 3; 50 U.S.C., 45-45d) as supplemented by Executive Order No. 8381, dated March 22, 1940, 5 F.R. 1147.

C. The following Article is added thereto and made a part thereof:

Article XXIII - TERMINATION

Subject to the approval or at the direction of the Contracting Officer, the Contractor shall have the right to terminate this subcontract at any time by a written notice to the Subcontractor whenever such termination is determined by the Contracting Officer to be in the best interests of the Government.

Appendix B

Preliminary Survey of Joslyn Stainless Steel Company Fort Wayne, Indiana

Work Performed
by the
Health and Safety Research Division
Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830

March 1980

PRELIMINARY SURVEY OF JOSLYN STAINLESS STEEL COMPANY FORT WAYNE, INDIANA

Work performed
by the
Health and Safety Research Division
Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830

March 1980

OAK RIDGE NATIONAL LABORATORY
operated by
UNION CARBIDE CORPORATION
for the
DEPARTMENT OF ENERGY
as part of the
Formerly Utilized Sites--
Remedial Action Program

JOSLYN STAINLESS STEEL COMPANY
Fort Wayne, Indiana

At the request of the Department of Energy (DOE, then ERDA), a preliminary survey was performed at the Joslyn Stainless Steel Company in Fort Wayne, Indiana (see Fig. 1), on October 23, 1976, to assess the radiological status of those facilities utilized under MED/AEC contract during the period 1944 through 1949. Edwin E. Hodgess, Jr., Vice President of Operations, provided information on Atomic Energy Commission (AEC) operations at this site and identified those parts of the plant involved in the process. A large part of this information was obtained by Hodgess from Paul Lauletta, a former Joslyn employee directly involved in the MED/AEC project.

The project involved the conversion of uranium billets into metal rods. The primary operations involved were heating, hot rolling, quenching, straightening, cooling, grinding, abrasive cutting, waste burning, and threading. Areas involved, designated by letters A through J, are shown on the attached plant layout (Fig. 2). The use made of each area and the sequence of operations are shown on Fig. 3. The billets were received by rail, unloaded at an unloading dock and transported by cart and overhead crane to the storage area. Movement of the billets from storage through the remainder of the process was accomplished by rail car, conveyor, and overhead trolley. The floors in the process area were dirt, concrete, and steel. All ash and residue from the burn area (Fig. 3, section I) were recovered by AEC for uranium accountability.

Present Use of Facilities

The grounds, buildings, and some equipment used during the uranium operations are presently being utilized by Joslyn. The furnaces were removed at the conclusion of the AEC contract. The equipment used in cutting, grinding, straightening, and threading is gone, and new concrete floors now cover these areas. The uranium billet storage area is presently used as a roll shop, and the 36-cm rolling mill is still in operation. The 46-cm mill was sold to AMEX Speciality Metal Corporation, Coldwater, Michigan, and the 23-cm mill was brokered through the T. B. Hudson Company and was believed to have been shipped to Sonora, Mexico.

Results of Preliminary Survey

The present survey was conducted on October 23, 1976, by H. W. Dickson of the Oak Ridge National Laboratory and W. T. Thornton of the Department of Energy-Oak Ridge Operations Office (then ERDA). A complete walk-through survey was performed with numerous radiation measurements made in each of the areas A through J involved in the uranium operations (see Fig. 2). Measurements were made of direct alpha, direct beta-gamma, transferable alpha, transferable beta-gamma, and external gamma-ray exposure rate. In general, there was no surface contamination; measurements made were indistinguishable from instrument background. A few isolated spots showed traces of alpha and beta-gamma contamination. The maximum alpha reading observed was 300 dpm/100 cm^2 and was found on the wall of the straightener area F. The maximum beta-gamma reading detected was 0.1 mrad/hr and located at an isolated spot in area B, now used as the roll shop. No transferable contamination was detected. The average external gamma radiation level ranged from 6-8 μR/hr and compares favorably with the natural radiation background for the area.

The last documented radiological survey, prior to the October 23, 1976, survey, of the Joslyn facilities was performed by A. R. Piccot of the AEC Health and Safety Laboratory (HASL) on August 1, 1949. The 1949 survey was carried out after all uranium operations had ceased and apparently before cleanup was complete. The HASL survey (1949) reported beta-gamma radiation levels as high as 20 mrad/hr (see attached report). All efforts to contact Mr. Piccot concerning the existence of any later survey have been unsuccessful. However, since accountability procedures in effect at the time of the operation required that all uranium scrap, oxides, residues, and wastes be returned to AEC, it is highly unlikely that quantities of radioactivity sufficient to present a potential health hazard would exist under new concrete surfaces or structures.

Because of the foregoing premise and since no radioactivity of significance was detected during the October 23, 1976, survey, it was concluded that no present or potential radiation-related health hazard exists due to MED/AEC operations and that no further DOE survey is required at the Fort Wayne facilities of Joslyn Stainless Steel.

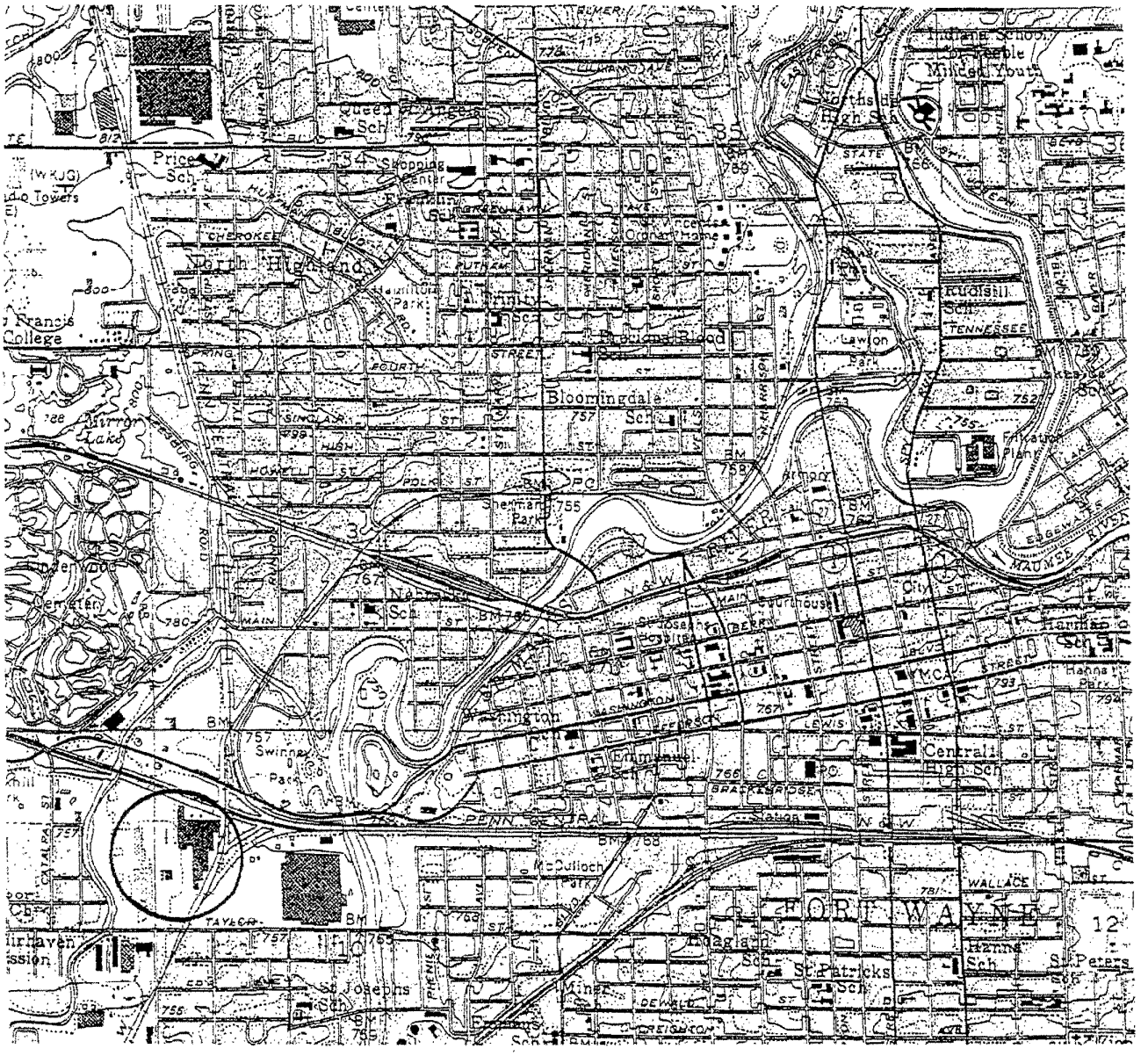
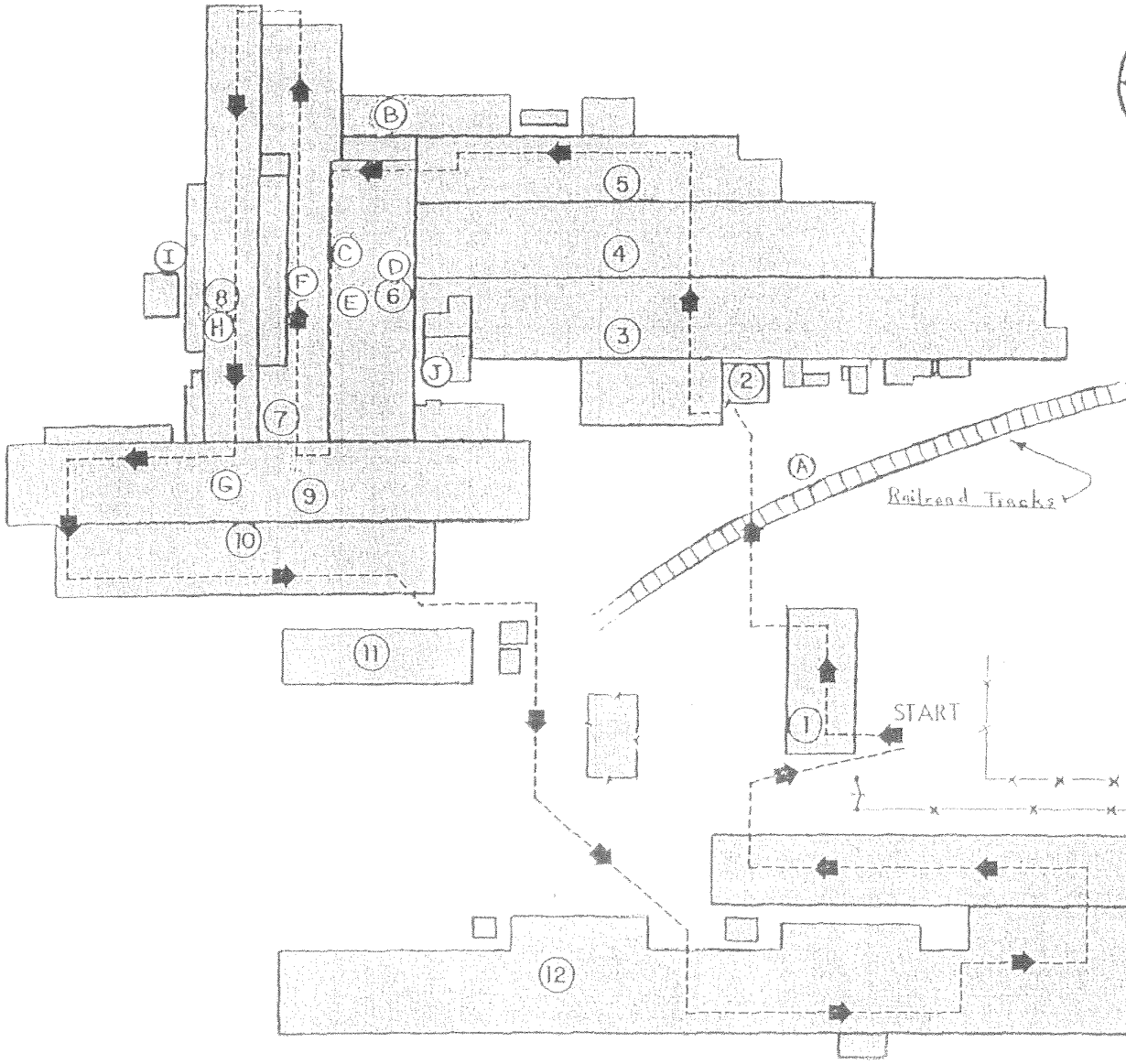


Fig. 1. Location of Joslyn Stainless Steel Company in Fort Wayne, Indiana.

JOSLYN STAINLESS STEELS



1 - OFFICE
2 - LABORATORY
3 - MELT SHOP
4 - BILLET YARD
5 - OLD BILLET CONDITIONING
6 - 12"- 14" MILL
7 - WIRE MILL
8 - PROCESSING
9 - PROCESSING and FINAL OPERATIONS
10 - WAREHOUSE
11 - MAINTENANCE
12 - PRIMARY MILLS
13 - NEW BILLET CONDITIONING

The alphabetical designation represents the sequence or material flow of the operation.

A. Railroad siding, billet receiving area: transfer to Area B was along a path which is now covered by Buildings 3, 4, and 5.

B. U billet storage - presently used as roll shop.

C. Furnace area: furnaces were removed at conclusion of AEC contract.

D. 18" mill used to roll larger billets: this mill has been sold to AMEX Speciality Metal Corporation, Coldwater, Michigan.

E. 14" mill used for rolling smaller billets: still in operation.

9" mill also was used for smaller U billets; this mill was sold, brokered through T. B. Hudson Company and thought to have been shipped to Sonora, Mexico.

F. Straightener area: equipment is gone and a new concrete floor now covers area.

G. Abrasive cutting area: equipment is gone and a new concrete floor covers area.

H. Production grinding area: equipment is gone and a new concrete floor covers area.

I. Burn area: all ash and residue recovered by AEC for uranium accountability.

J. Lathe turning area: lathe used to put screw threads on each U rod is gone; rods were packaged for shipment in this area.

Fig. 3. Uranium operation areas at the Joslyn Stainless Steel Company in Fort Wayne, Indiana.

(12)

The Files

August 22, 1949

[redacted], Radiation Section

RESIDUAL CONTAMINATION SURVEY AT JOSLYN STEEL CO.

REFER TO SYMBOL: DH:ARP

On August 1, 1949 the writer visited the Joslyn Mfg. & Supply Co. rolling mills at Fort Wayne Indiana. Radiation measurements were made with an IDL and a Zeuto on contaminated floors and machinery involved in previous uranium rolling, grinding & machining operations. All work on uranium had ceased except for the removal of drums containing scraps and clean up material which were to be shipped out the following day. Most of the machines were back in operation on other materials. All AEC personnel expected to leave the following day.

Receiving and Storage Area:

Billets were received by boxcar and unloaded at the unloading dock next to the tracks, picked up by overhead crane, carried across the building to within 10 or 15' of the wire cage compound; dropped on carts, wheeled into compound and stored until needed.

Contamination at the unloading dock and along the path taken by the billets from boxcar to compound was very slight with typical readings of 500, 300,300 alpha d/m until the floor at the entrance to and in front of the compound was reached where readings were 2000, 8000, 800. The large building containing the track and receiving dock was 11 bays long by 4 bays wide and contained the rough turner. Except for the vicinity of the rough turner described later, fifteen spot checks in other parts of this building indicated negligible activity (less 300).

Floor readings inside the compound varied from 15,000 to 20,000 with a general background in the center of the room of 0.5 mr/hr. The compound still contained barrels of reclaimed scrap and other material which was to be shipped out the following day along with several others stacked just outside the compound. The scale in the compound gave a reading of 10,000 d/m on the platform. A metal drying pan on the floor outside of the compound gave an inside contamination reading of 20,000 to 30,000 d/m. The field office next to the compound gave floor readings of about 300 d/m.

Heat Treatment Area:

The billets were removed from the compound to the heating furnaces, a distance of some 70', by means of a rail car and stored on racks on each side of a bank of furnaces. They were then heated individually

The Files August 22, 1949

[redacted]

RESIDUAL CONTAMINATION SURVEY AT JOSLYN STEEL CO.

in 8 small resistance type electric heated furnaces to a temperature of 1050° with a natural gas atmosphere. After a 30 minute soaking at this temperature, the billets were carried to the rolls by means of the rail car or an overhead trolley.

The floor from the entrance of the compound to the rail car averaged 1000 d/m with readings of 2000 and 4000 directly over the rail which is recessed into the concrete floor. Readings between the rails from the loading point to furnaces gave following: 600, 200, 200, 2000 in front of the wooden storage rack, 1500 between rack and first furnace, 1600 in front of the furnace, 2500 in front of the second rack, 2000 at the end of the track. The highest IDL contact reading between the track was 0.3 mr/hr. The dirt floor along the right side of the track opposite the furnaces and racks gave readings of 1200, 800, 1000 alpha d/m with a maximum of 0.4 mrep/hr in contact.

The wooden platform and dirt floor in front of the first rack averaged 1000α d/m and 0.2 mrep/hr. Cross pieces on the rack averaged 500 alpha d/m or less. The wooden catwalks in front of the eight furnaces and the platform in front of the second rack gave beta readings from 5000 to 10,000 and IDL contact readings of 0.5 to 1 mrep/hr.

disposition

The top of the furnaces indicated contamination of from 10,000 to 25,000 α d/m and 1 to 2.5 mrep/hr. The IDL with the probe stuck into the furnace registered from 5 to 12 mrep/hr. These furnaces were designed for AEC and are in standby.

Rolling and Quench Area:

The mill rough and finishing rolls are set up immediately adjacent to each other. After rolling, the rods were placed on a roll conveyor and moved for a distance of approximately 80' outside the building where they were stamped for identification. After stamping, the rods were removed from the conveyor and placed over a cooling pit on cross bars for 10 minutes, quenched in a water bench tank, allowed to cool and removed by jeep to the next operation or to the freight car for shipping.

The mill surroundings are very irregular with dirt, concrete and steel floors, conveyors and trenches and stored material in the vicinity of the mill. A concrete slab, 30' from rolls (path of hot billets) gave beta readings of 800 to 3000 α d/m. Steel flooring 20' behind the rolls gave

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RESIDUAL CONTAMINATION SURVEY AT JOSLYN STEEL CO.

no detectable contamination and looked clean. In general, steel floorings away from the rolls had only slight contamination. In the immediate vicinity of the rolls (3 or 4' radius) contamination on the steel and cracks between sections varied from 500 to 4,500 α d/m. The screwdown and gearbox housing when dust had settled indicated contamination from 1500 to 2000 α d/m. Spots under the rolls and in inaccessible cracks where oxide scale had fallen gave readings as high as 7 or 8 mrep/hr. One foot out from the rolls the background was about 0.5 mr/hr (probably from material in the pits under the rolls). A hurried check on rolls while turning showed no significant alpha. A pile of steel guides used in the uranium rolling (pile 20' from rolls) indicated as high as 15,000 α d/m and 4 mr/hr in contact. The trench under the conveyor to the quench tank was oil soaked and gave readings of 3 or 4 mrep/hr. The quench tank area was cluttered with stored material and the dirt was wet from splashing. Contamination was detectable within a 15' radius and readings from 0.5 to 1 mrep/hr at one foot high and 2 mr in contact with dirt were observed.

Cropping on Cutamatic:

After quenching the rods are bundled (six to a bundle) and are carried to the cut-off machine, called cutamatic, which is located in the cold finishing department. The rough ends were cropped while a heavy flow of coolant was used over the cutting tool and rod end to minimize sparking hazard.

The machine is surrounded by a concrete floor with detectable contamination 20' from the machine. Contamination on the floor next to the machine varied from 2,000 to 10,000 α d/m, and 0.5 to 2 mrep/hr. The floor under the rack which supported the rods had contamination as high as 20,000 α d/m and 10 to off scale on the IDL. Contamination on the outside of the housing near the cutter was as high as 20,000 α d/m and 0.2 to 1 mrep/hr with 30,000 α d/m in the bottom of the coolant reservoir and 20 mrep/hr or more on the IDL. Background 3' high in front of the rack was 0.5 to 2 mr/hr with 1 to 3 mrep/hr in back of the rack. Oxide contamination was visible on the floor under the rack and apparently had not been cleaned. Other cracks and catch basins on the machine gave 10 to off-scale readings on the IDL. In order to clean these remote parts, the machine would probably have to be dismantled.

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RESIDUAL CONTAMINATION SURVEY AT JOSLYN STEEL CO.

The concrete floor in front of the machine indicated 3000 d/m and steel gratings on the floor gave 10 to off-scale readings on the IDL, due to material which had fallen in trenches under the gratings. Contamination on the wood rack varied from 2000 to 3000 d/m. A spare grinding wheel next to the machine read 2 to 3 mrep/hr. in contact and 5000 to 8000 d/m. The machine was being prepared for use on other materials on the following day.

Threading Machine:

The threading was done on a Pratt & Whitney 15" lathe with a continuous flow of coolant over the cutting point.

The lathe and surroundings were only moderately contaminated with the floor in front of the lathe giving 1100 d/m and lathe parts less than 500 d/m. The supporting wood rack had negligible contamination except for 3 guide grooves which indicated from 3000 to 5000 d/m.

Other Areas:

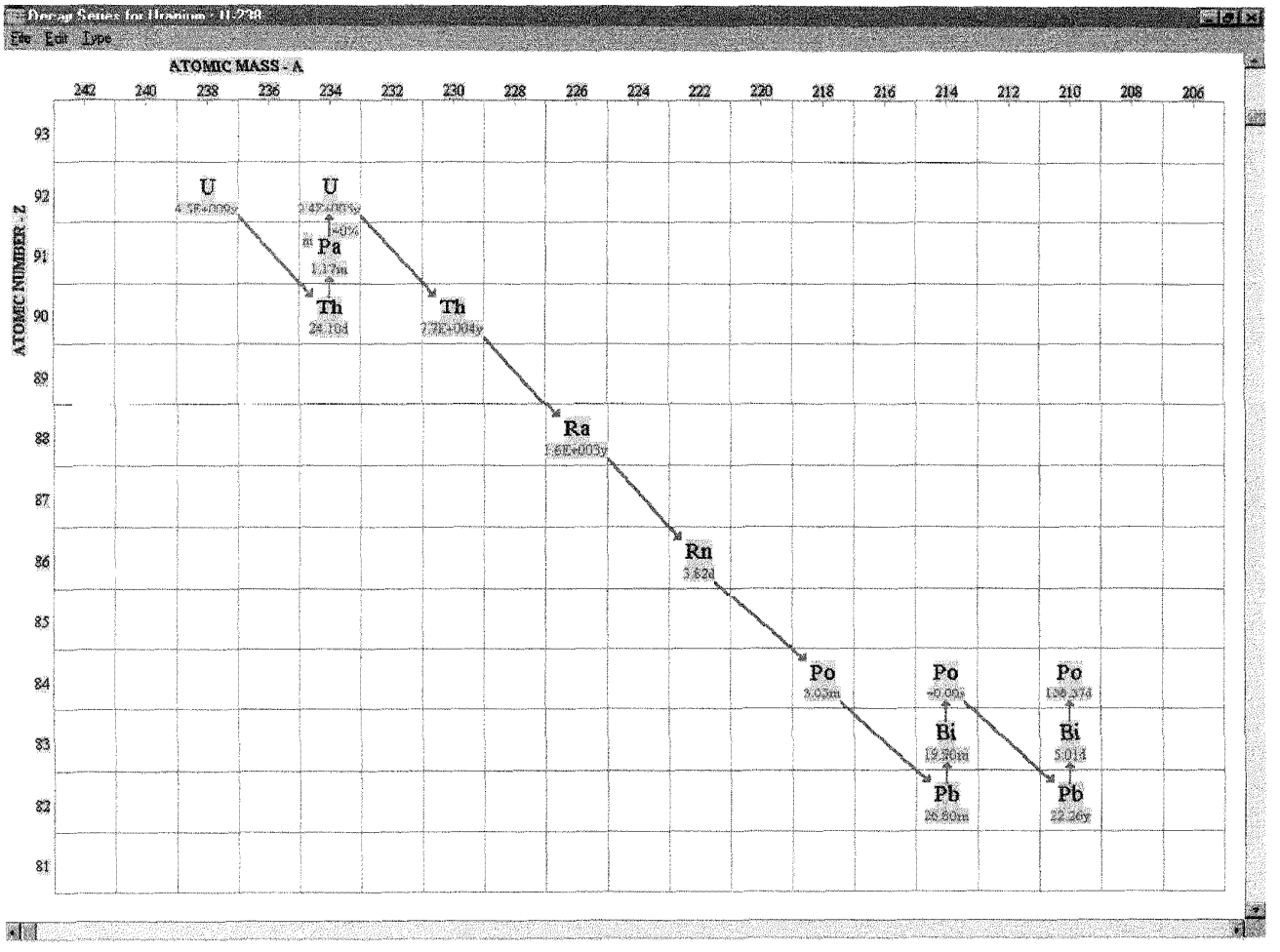
No detectable contamination was observed in the inspection department. The scrap area behind the factory contained contaminated materials such as drying pans, broken cutomatic wheels, wood, etc. Readings up to 10 mrep/hr were observed with the IDL in contact with some of these materials.

The purpose of this survey was to obtain a record of the contamination and radiation levels and, therefore, no recommendations or conclusions are necessary in this memorandum.

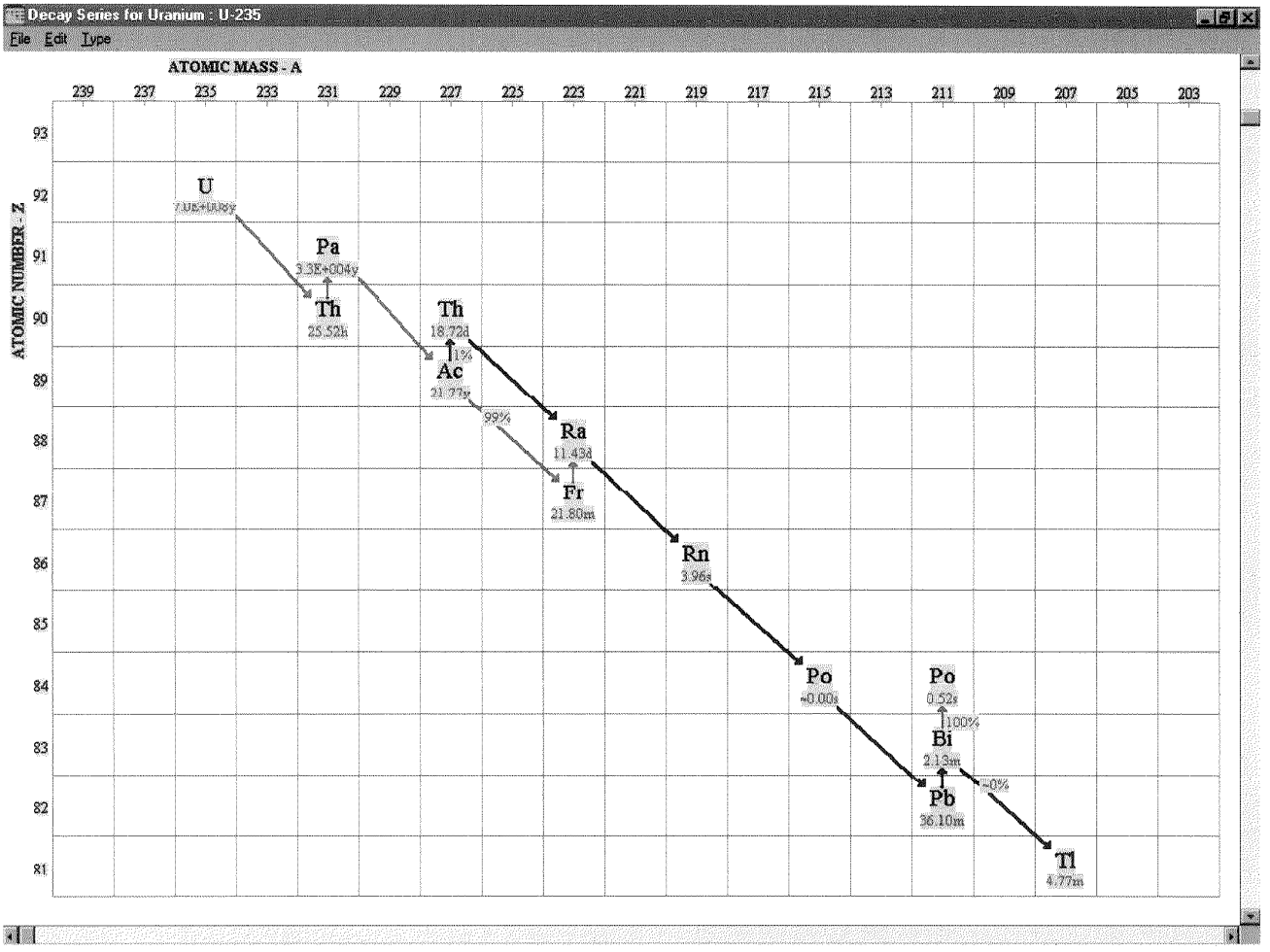
Appendix C

Uranium and Actinium Series

Uranium Series



Actinium Series



Appendix D

Gamma Spectroscopy Results

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 040599 PIONEER RAG

Sample Size . . . . . 1.06e+003 g	Spectrum File . . H:\PCASPEC\040599.SPM
Sampling Start. 00-00-00 00:00	Counting Start. 02-26-04 11:11
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)		Halflife (hrs)	Peaks Found
Bi-211	Average:	1.42e-005	+-2.76e-006	3.55e-002	2 of 5
	72.87	1.42e-005	+-2.92e-006		
	82.60	1.43e-005	+-8.55e-006		
Ra-223	83.78	2.06e-006	+-1.94e-007	2.74e+002	1 of 10
Th-227	88.47	1.48e-006	+-1.67e-007	4.49e+002	1 of 10
Th-231	Average:	8.80e-006	+-7.32e-007	2.55e+001	2 of 6
	84.21	7.90e-006	+-7.44e-007		
	89.95	3.69e-005	+-4.15e-006		
Pa-234	Average:	1.12e-006	+-9.75e-008	6.70e+000	3 of 10
	63.00	1.11e-006	+-2.23e-006		
	98.44	1.12e-006	+-1.35e-007		
	111.00	1.12e-006	+-1.41e-007		
Th-234	Average:	1.98e-004	+-1.01e-006	5.78e+002	3 of 3
	63.29	9.99e-005	+-1.90e-006		
	92.38	2.35e-004	+-1.67e-006		
	92.80	2.38e-004	+-1.69e-006		
Pb-212	74.82	3.60e-006	+-3.78e-007	1.06e+001	1 of 6
Th-228	84.37	4.20e-005	+-3.96e-006	1.68e+004	1 of 2
U-235	Average:	4.62e-006	+-1.14e-007	6.17e+012	6 of 10
	89.95	4.88e-006	+-1.42e-006		
	109.14	4.88e-006	+-1.11e-006		
	143.76	4.59e-006	+-1.56e-007		
	163.35	4.88e-006	+-2.90e-007		
	202.12	5.32e-006	+-8.21e-007		
	205.31	4.47e-006	+-2.18e-007		
Ra-226	186.10	7.00e-007	+-6.16e-009	1.40e+007	1 of 1

Pa-234m	1001.00	1.67e-004 +-4.06e-006	1.95e-002	1 of 2
K-40	1460.80	8.46e-007 +-1.40e-007	1.12e+013	1 of 1

TOTAL: 4.44e-004 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
44.98	195.39	1289	96	183	1941	1.45	4.655e+001
112.24	470.19	1946	159	320	4569	1.32	1.231e+001
257.63	1064.24	473	67	133	816	1.52	2.826e+000
742.58	3045.58	204	35	67	219	1.38	3.141e+000
766.00	3141.28	874	43	66	200	1.63	1.387e+001

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 040600 PIONEER P-1

Sample Size . . . . . 9.90e+002 g	Spectrum File . . H:\PCASPEC\040600.SPM
Sampling Start. 00-00-00 00:00	Counting Start. 02-26-04 12:12
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Bi-214	Average:	8.23e-007 +-2.84e-008	3.32e-001	4 of 10
	609.31	8.21e-007 +-3.25e-008		
	727.17	5.02e-007 +-9.21e-008		
	1120.30	9.24e-007 +-1.11e-007		
	1764.50	1.17e-006 +-1.04e-007		
Ac-228	Average:	5.75e-007 +-3.91e-008	6.13e+000	4 of 10
	93.35	5.57e-007 +-5.29e-007		
	338.32	5.60e-007 +-8.03e-008		
	911.07	5.57e-007 +-5.34e-008		
	969.11	6.36e-007 +-8.29e-008		
Th-234	Average:	3.07e-006 +-4.81e-007	5.78e+002	2 of 3
	92.38	3.05e-006 +-6.76e-007		
	92.80	3.09e-006 +-6.85e-007		
Tl-208	Average:	1.96e-007 +-1.35e-008	5.09e-002	3 of 8
	74.97	1.93e-007 +-5.35e-007		
	510.84	1.85e-007 +-4.98e-008		
	583.14	1.97e-007 +-1.40e-008		
Pb-212	Average:	4.82e-007 +-2.29e-008	1.06e+001	3 of 6
	74.82	4.83e-007 +-1.72e-007		
	77.11	4.81e-007 +-1.14e-007		
	238.63	4.82e-007 +-2.36e-008		
Pb-214	Average:	8.47e-007 +-2.55e-008	4.47e-001	5 of 6
	74.82	8.52e-007 +-2.96e-007		
	77.11	8.54e-007 +-1.97e-007		
	241.98	8.55e-007 +-1.05e-007		
	295.21	8.55e-007 +-5.06e-008		

	351.92	8.43e-007 +-3.13e-008			
Ra-226	186.10	2.51e-008 +-2.88e-009	1.40e+007	1 of	1
Ra-224	240.98	5.42e-007 +-2.00e-007	8.69e+001	1 of	1
K-40	1460.80	9.56e-006 +-3.05e-007	1.12e+013	1 of	1

TOTAL: 1.61e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
45.05	195.68	446	51	93	507	1.31	1.605e+001

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 040601 PIONEER P-2

Sample Size . . . . . 8.97e+002 g	Spectrum File . . H:\PCASPEC\040601.SPM
Sampling Start. 00-00-00 00:00	Counting Start. 02-26-04 13:26
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Bi-214	Average:	9.22e-007 +-3.40e-008	3.32e-001	3 of 10
	609.31	8.85e-007 +-3.64e-008		
	1120.30	8.37e-007 +-1.43e-007		
	1764.50	1.41e-006 +-1.23e-007		
Bi-211	351.07	1.65e-007 +-9.89e-008	3.55e-002	1 of 5
Ac-228	Average:	6.00e-007 +-4.47e-008	6.13e+000	4 of 10
	93.35	6.28e-007 +-5.31e-007		
	338.32	4.85e-007 +-8.82e-008		
	911.07	6.29e-007 +-6.05e-008		
	969.11	6.69e-007 +-1.02e-007		
Th-234	Average:	2.43e-006 +-4.83e-007	5.78e+002	2 of 3
	92.38	2.41e-006 +-6.79e-007		
	92.80	2.45e-006 +-6.88e-007		
Tl-208	Average:	2.13e-007 +-1.54e-008	5.09e-002	3 of 8
	74.97	2.14e-007 +-6.02e-007		
	510.84	2.34e-007 +-5.74e-008		
	583.14	2.12e-007 +-1.60e-008		
Pb-212	Average:	5.25e-007 +-2.67e-008	1.06e+001	3 of 6
	74.82	5.25e-007 +-1.93e-007		
	77.11	5.26e-007 +-1.29e-007		
	238.63	5.25e-007 +-2.76e-008		
Pb-214	Average:	8.11e-007 +-2.83e-008	4.47e-001	5 of 6
	74.82	8.09e-007 +-3.32e-007		
	77.11	8.12e-007 +-2.23e-007		
	241.98	8.11e-007 +-1.18e-007		
	295.21	8.11e-007 +-5.77e-008		
	351.92	8.11e-007 +-3.44e-008		

Ra-226	186.10	2.39e-008 +-3.19e-009	1.40e+007	1 of 1
Ra-224	240.98	4.41e-007 +-2.23e-007	8.69e+001	1 of 1
K-40	1460.80	1.27e-005 +-3.61e-007	1.12e+013	1 of 1

TOTAL: 1.88e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
45.03	195.59	450	52	96	532	1.66	1.621e+001

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 040602 PIONEER P-3 6-8

Sample Size . . . . . 8.71e+002 g	Spectrum File . . h:\pcaspec\040602.SPM
Sampling Start. 00-00-00 00:00	Counting Start. 02-26-04 14:38
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Bi-214	Average:	9.42e-007 +-3.32e-008	3.32e-001	3 of 10
	609.31	8.78e-007 +-3.61e-008		
	1120.30	1.15e-006 +-1.20e-007		
	1764.50	1.40e-006 +-1.16e-007		
Ac-228	Average:	5.38e-007 +-4.00e-008	6.13e+000	3 of 10
	338.32	4.71e-007 +-9.14e-008		
	911.07	5.89e-007 +-5.19e-008		
	969.11	4.58e-007 +-8.62e-008		
Th-234	Average:	3.75e-006 +-4.75e-007	5.78e+002	3 of 3
	63.29	3.92e-006 +-9.03e-007		
	92.38	3.92e-006 +-7.84e-007		
	92.80	3.44e-006 +-7.95e-007		
Tl-208	Average:	1.74e-007 +-1.50e-008	5.09e-002	2 of 8
	510.84	2.83e-007 +-5.33e-008		
	583.14	1.64e-007 +-1.56e-008		
Pb-212	Average:	4.88e-007 +-2.41e-008	1.06e+001	3 of 6
	74.82	4.86e-007 +-1.77e-007		
	77.11	4.88e-007 +-1.28e-007		
	238.63	4.88e-007 +-2.48e-008		
Pb-214	Average:	9.46e-007 +-2.83e-008	4.47e-001	5 of 6
	74.82	5.70e-007 +-3.05e-007		
	77.11	9.87e-007 +-2.20e-007		
	241.98	9.89e-007 +-1.19e-007		
	295.21	9.88e-007 +-5.96e-008		
	351.92	9.32e-007 +-3.39e-008		
Ra-226	186.10	4.05e-008 +-3.16e-009	1.40e+007	1 of 1
Ra-224	240.98	4.72e-007 +-2.26e-007	8.69e+001	1 of 1

K-40	1460.80	1.13e-005 +-3.71e-007	1.12e+013	1 of 1

TOTAL: 1.86e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
45.09	195.83	349	52	98	564	1.29	1.253e+001

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 040603 PIONEER P-3 8-10

Sample Size . . . . . 8.42e+002 g	Spectrum File . . H:\PCASPEC\040603.SPM
Sampling Start. 00-00-00 00:00	Counting Start. 02-26-04 15:39
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)		Halflife (hrs)	Peaks Found
Bi-214	Average:	1.08e-006	+-3.53e-008	3.32e-001	3 of 10
	609.31	1.04e-006	+-3.83e-008		
	1120.30	1.21e-006	+-1.29e-007		
	1764.50	1.32e-006	+-1.29e-007		
Ac-228	Average:	6.13e-007	+-4.41e-008	6.13e+000	4 of 10
	93.35	6.45e-007	+-5.72e-007		
	338.32	6.25e-007	+-9.50e-008		
	911.07	6.42e-007	+-5.67e-008		
	969.11	4.97e-007	+-1.06e-007		
Th-234	Average:	2.12e-006	+-5.20e-007	5.78e+002	2 of 3
	92.38	2.10e-006	+-7.31e-007		
	92.80	2.13e-006	+-7.41e-007		
Tl-208	Average:	1.90e-007	+-1.57e-008	5.09e-002	2 of 8
	510.84	2.56e-007	+-5.47e-008		
	583.14	1.84e-007	+-1.64e-008		
Pb-212	Average:	5.35e-007	+-2.72e-008	1.06e+001	3 of 6
	74.82	5.36e-007	+-1.93e-007		
	77.11	5.35e-007	+-1.37e-007		
	238.63	5.35e-007	+-2.80e-008		
Pb-214	Average:	9.68e-007	+-3.11e-008	4.47e-001	5 of 6
	74.82	7.84e-007	+-3.33e-007		
	77.11	9.70e-007	+-2.35e-007		
	241.98	9.69e-007	+-1.33e-007		
	295.21	9.70e-007	+-6.07e-008		
	351.92	9.69e-007	+-3.84e-008		
Ra-226	186.10	1.82e-008	+-3.26e-009	1.40e+007	1 of 1
Ra-224	240.98	7.77e-007	+-2.53e-007	8.69e+001	1 of 1

K-40 1460.80 1.40e-005 +-3.98e-007 1.12e+013 1 of 1

TOTAL: 2.03e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
45.01	195.53	393	47	86	482	1.99	1.417e+001

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 040604 PIONEER P-4

Sample Size . . . . . 9.38e+002 g	Spectrum File . . h:\pcaspec\040604.SPM
Sampling Start. 00-00-00 00:00	Counting Start. 02-26-04 16:41
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Bi-214	Average:	9.50e-007 +-3.22e-008	3.32e-001	3 of 10
	609.31	9.19e-007 +-3.48e-008		
	1120.30	9.71e-007 +-1.33e-007		
	1764.50	1.26e-006 +-1.11e-007		
Ac-228	Average:	5.13e-007 +-4.12e-008	6.13e+000	4 of 10
	93.35	5.17e-007 +-4.47e-007		
	338.32	5.84e-007 +-7.73e-008		
	911.07	5.14e-007 +-5.98e-008		
	969.11	4.22e-007 +-8.57e-008		
Th-234	Average:	2.66e-006 +-4.06e-007	5.78e+002	2 of 3
	92.38	2.64e-006 +-5.71e-007		
	92.80	2.68e-006 +-5.78e-007		
Tl-208	Average:	1.84e-007 +-1.40e-008	5.09e-002	3 of 8
	74.97	2.04e-008 +-5.69e-007		
	510.84	2.41e-007 +-5.24e-008		
	583.14	1.79e-007 +-1.46e-008		
Pb-212	Average:	4.41e-007 +-2.32e-008	1.06e+001	3 of 6
	74.82	4.42e-007 +-1.83e-007		
	77.11	4.41e-007 +-1.32e-007		
	238.63	4.41e-007 +-2.38e-008		
Pb-214	Average:	9.49e-007 +-2.74e-008	4.47e-001	5 of 6
	74.82	9.98e-007 +-3.14e-007		
	77.11	1.00e-006 +-2.27e-007		
	241.98	1.00e-006 +-1.11e-007		
	295.21	1.00e-006 +-5.28e-008		
	351.92	9.21e-007 +-3.40e-008		
Ra-226	186.10	1.63e-008 +-3.03e-009	1.40e+007	1 of 1

K-40	1460.80	1.18e-005 +-3.48e-007	1.12e+013	1 of 1

TOTAL: 1.75e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
45.21	196.33	469	52	96	538	1.90	1.674e+001

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 040605 PIONEER P-5

Sample Size . . . . . 8.45e+002 g	Spectrum File . . h:\pcaspec\040605.SPM
Sampling Start. 00-00-00 00:00	Counting Start. 02-26-04 17:42
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Bi-214	Average:	7.55e-007 +-3.21e-008	3.32e-001	3 of 10
	609.31	7.16e-007 +-3.46e-008		
	1120.30	9.76e-007 +-1.28e-007		
	1764.50	1.02e-006 +-1.16e-007		
Ac-228	Average:	4.78e-007 +-4.35e-008	6.13e+000	4 of 10
	93.35	5.16e-007 +-5.32e-007		
	338.32	4.23e-007 +-8.52e-008		
	911.07	5.14e-007 +-6.08e-008		
	969.11	4.57e-007 +-9.23e-008		
Th-234	Average:	6.22e-006 +-4.84e-007	5.78e+002	2 of 3
	92.38	6.18e-006 +-6.80e-007		
	92.80	6.26e-006 +-6.89e-007		
Tl-208	583.14	1.35e-007 +-1.60e-008	5.09e-002	1 of 8
Pb-212	Average:	4.31e-007 +-2.38e-008	1.06e+001	3 of 6
	74.82	4.32e-007 +-1.76e-007		
	77.11	4.32e-007 +-1.24e-007		
	238.63	4.31e-007 +-2.45e-008		
Pb-214	Average:	7.92e-007 +-2.80e-008	4.47e-001	5 of 6
	74.82	7.99e-007 +-3.03e-007		
	77.11	8.45e-007 +-2.14e-007		
	241.98	8.43e-007 +-1.18e-007		
	295.21	8.44e-007 +-5.61e-008		
	351.92	7.67e-007 +-3.42e-008		
Ra-226	186.10	2.66e-008 +-3.22e-009	1.40e+007	1 of 1
K-40	1460.80	1.22e-005 +-3.67e-007	1.12e+013	1 of 1

TOTAL: 2.10e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
45.00	195.46	375	49	93	455	2.09	1.353e+001

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: PIONEER B-CLOTH

Sample Size . . . . . 1.22e+002 g	Spectrum File . . h:\PCASPEC\040832.SPM
Sampling Start. 00-00-00 00:00	Counting Start. 03-10-04 09:40
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)		Halflife (hrs)	Peaks Found
Bi-214	1764.50	7.78e-006	+-8.74e-007	3.32e-001	1 of 10
Ra-223	Average:	2.26e-004	+-3.07e-006	2.74e+002	3 of 10
	81.07	5.01e-005	+-4.99e-006		
	83.78	2.27e-004	+-4.10e-006		
	144.24	1.27e-003	+-1.22e-005		
Th-231	Average:	1.02e-003	+-1.52e-005	2.55e+001	3 of 6
	81.24	8.47e-004	+-8.44e-005		
	84.21	8.70e-004	+-1.57e-005		
	89.95	6.04e-003	+-8.97e-005		
Pa-234	Average:	2.59e-005	+-6.79e-007	6.70e+000	9 of 10
	63.00	2.17e-004	+-5.42e-005		
	98.44	2.17e-004	+-3.59e-006		
	111.00	1.98e-005	+-2.20e-006		
	131.20	1.50e-005	+-1.80e-006		
	569.50	1.48e-005	+-2.37e-006		
	880.51	1.48e-005	+-1.63e-006		
	883.24	1.43e-005	+-1.49e-006		
	926.00	2.77e-005	+-1.84e-006		
	946.00	2.80e-005	+-1.89e-006		
Th-234	Average:	1.94e-002	+-2.74e-005	5.78e+002	3 of 3
	63.29	9.20e-003	+-4.63e-005		
	92.38	2.47e-002	+-4.78e-005		
	92.80	2.50e-002	+-4.84e-005		
Pb-212	74.82	8.79e-005	+-8.57e-006	1.06e+001	1 of 6
Th-228	84.37	4.63e-003	+-8.37e-005	1.68e+004	1 of 2
U-235	Average:	6.80e-006	+-3.62e-007	6.17e+012	8 of 10
	89.95	4.33e-006	+-3.06e-005		

	93.35	4.33e-006 +-2.92e-005			
	105.00	1.82e-004 +-2.30e-005			
	143.76	4.35e-006 +-3.76e-006			
	163.35	3.85e-004 +-7.17e-006			
	183.72	4.35e-006 +-3.65e-007			
	202.12	1.56e-004 +-2.03e-005			
	205.31	4.09e-004 +-6.17e-006			
Ra-226	186.10	5.88e-005 +-1.60e-007	1.40e+007	1 of 1	
Pa-234m	Average:	1.65e-002 +-1.06e-004	1.95e-002	2 of 3	
	766.41	1.64e-002 +-2.32e-004			
	1001.00	1.65e-002 +-1.19e-004			

TOTAL: 4.19e-002 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
42.84	185.08	11449	284	536	16692	1.70	4.630e+002
72.78	307.46	2647	286	543	24560	1.41	3.347e+001
112.46	469.61	10596	597	1260	53717	1.54	6.686e+001
194.71	805.75	1687	225	455	10892	1.20	8.737e+000
226.71	936.51	1196	196	400	8019	1.15	6.607e+000
258.10	1064.79	4966	176	334	5599	1.31	2.970e+001
691.15	2834.55	275	82	168	1361	1.57	3.950e+000
733.19	3006.36	293	90	185	1508	1.40	4.456e+000
742.83	3045.74	2453	109	204	1846	1.53	3.778e+001
786.37	3223.66	1539	91	170	1332	1.65	2.505e+001
921.88	3777.48	302	38	70	248	1.79	5.740e+000
1193.97	4889.41	310	29	48	100	1.06	7.585e+000
1434.28	5871.49	196	26	45	87	2.74	5.739e+000
1510.55	6183.19	223	30	55	116	1.53	6.869e+000
1554.37	6362.29	154	26	49	99	2.07	4.878e+000
1737.93	7112.44	341	23	30	39	1.57	1.205e+001
1831.39	7494.39	250	19	23	23	2.21	9.299e+000
1867.79	7643.12	139	21	37	37	2.18	5.271e+000
1875.23	7673.52	106	15	23	22	2.10	4.035e+000

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 040833 PIONEER B-THRESHOLD SOIL

Sample Size . . . . . 3.78e+002 g	Spectrum File . . h:\PCASPEC\040833.SPM
Sampling Start. 00-00-00 00:00	Counting Start. 03-10-04 10:45
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Ra-223	Average:	1.12e-004 +-2.09e-006	2.74e+002	2 of 10
	83.78	1.26e-004 +-3.03e-006		
	94.90	9.86e-005 +-2.87e-006		
Th-227	94.00	7.89e-005 +-2.30e-006	4.49e+002	1 of 10
Th-231	Average:	6.72e-004 +-1.12e-005	2.55e+001	3 of 6
	84.21	4.84e-004 +-1.16e-005		
	89.95	4.70e-003 +-5.88e-005		
	114.27	1.36e-003 +-5.56e-005		
Pa-234	Average:	5.07e-005 +-4.31e-007	6.70e+000	10 of 10
	63.00	2.56e-004 +-3.11e-005		
	94.66	2.55e-004 +-2.05e-006		
	98.44	2.55e-004 +-1.75e-006		
	111.00	3.48e-004 +-3.13e-006		
	131.20	1.15e-005 +-1.23e-006		
	569.50	1.38e-005 +-1.55e-006		
	880.51	1.85e-005 +-1.03e-006		
	883.24	1.62e-005 +-8.75e-007		
	926.00	2.97e-005 +-1.28e-006		
	946.00	3.00e-005 +-1.14e-006		
Th-234	Average:	1.47e-002 +-1.52e-005	5.78e+002	3 of 3
	63.29	5.82e-003 +-2.66e-005		
	92.38	1.89e-002 +-2.61e-005		
	92.80	1.91e-002 +-2.65e-005		
Pb-212	Average:	5.69e-005 +-5.93e-006	1.06e+001	2 of 6
	74.82	5.69e-005 +-5.97e-006		
	115.19	5.69e-005 +-5.25e-005		
Th-228	84.37	2.57e-003 +-6.19e-005	1.68e+004	1 of 2

U-235	Average:	3.38e-004 +-1.82e-006	6.17e+012	7 of	10
	89.95	3.53e-004 +-2.01e-005			
	93.35	3.53e-004 +-7.22e-006			
	105.00	1.90e-004 +-1.92e-005			
	143.76	3.29e-004 +-2.44e-006			
	163.35	3.53e-004 +-4.78e-006			
	202.12	2.27e-004 +-1.53e-005			
	205.31	3.62e-004 +-4.02e-006			
Ac-227	115.35	7.76e-003 +-3.17e-004	1.91e+005	1 of	1
Ra-226	186.10	5.25e-005 +-9.61e-008	1.40e+007	1 of	1
Pb-211	831.96	2.21e-005 +-6.52e-006	6.02e-001	1 of	3
Po-211	897.83	1.24e-004 +-2.47e-005	1.43e-004	1 of	2
Pa-234m	Average:	1.72e-002 +-6.27e-005	1.95e-002	2 of	3
	766.41	1.75e-002 +-1.38e-004			
	1001.00	1.72e-002 +-7.03e-005			
Tl-207	897.83	2.68e-004 +-5.35e-005	7.95e-002	1 of	1

TOTAL: 4.40e 002 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
41.60	180.01	35243	572	1122	60528	2.28	1.526e+003
72.70	307.13	6925	521	999	80759	1.78	8.775e+001
112.69	470.57	64172	570	995	78283	1.42	4.040e+002
120.96	504.34	1964	713	1502	90666	1.33	1.152e+001
152.20	632.00	2791	658	1361	88949	1.37	1.433e+001
194.84	806.25	5215	463	935	48277	1.44	2.701e+001
226.94	937.45	3628	384	775	33213	1.70	2.005e+001
258.11	1064.85	15043	359	694	25372	1.35	8.998e+001
691.46	2835.80	965	175	364	5423	1.81	1.387e+001
733.34	3006.96	1000	179	372	5652	1.46	1.521e+001
742.89	3045.98	7374	204	386	6852	1.65	1.136e+002
786.30	3223.42	4517	179	347	5548	1.66	7.353e+001
806.23	3304.85	1059	155	320	4194	1.86	1.766e+001
825.25	3382.58	637	150	317	3462	1.93	1.087e+001
851.50	3489.84	758	128	263	2835	1.51	1.333e+001
887.35	3636.35	383	87	175	1485	1.77	7.013e+000
921.86	3777.40	1078	80	151	1077	1.88	2.049e+001
1125.43	4609.33	394	57	112	558	2.19	9.099e+000
1193.93	4889.27	936	61	112	513	1.74	2.290e+001
1237.45	5067.11	303	54	108	517	1.92	7.678e+000
1434.56	5872.65	606	48	86	294	2.90	1.775e+001
1510.59	6183.35	874	49	84	271	1.52	2.692e+001
1554.11	6361.21	501	45	83	304	1.79	1.587e+001
1737.92	7112.41	1199	40	42	72	2.41	4.237e+001
1765.73	7226.06	438	31	48	95	2.23	1.572e+001
1809.15	7403.49	217	19	26	27	2.38	7.976e+000
1831.65	7495.44	900	36	42	70	2.08	3.348e+001
1867.82	7643.27	415	36	65	128	2.09	1.574e+001
1875.08	7672.92	387	35	61	118	2.12	1.473e+001
1911.35	7821.17	301	22	28	32	2.22	1.168e+001
1937.30	7927.19	147	15	19	14	2.25	5.778e+000

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 040834 PIONEER C-WALL

Sample Size . . . . . 1.14e+002 g	Spectrum File . . H:\PCASPEC\040834.SPM
Sampling Start. 00-00-00 00:00	Counting Start. 03-10-04 11:47
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)		Halflife (hrs)	Peaks Found
Ra-223	Average:	1.38e-004	+-2.93e-006	2.74e+002	2 of 10
	83.78	6.32e-005	+-3.15e-006		
	144.24	6.32e-004	+-8.06e-006		
U-234	53.20	4.59e-003	+-1.06e-003	2.14e+009	1 of 1
Th-231	Average:	3.00e-004	+-1.13e-005	2.55e+001	3 of 6
	84.21	2.42e-004	+-1.21e-005		
	89.95	1.57e-003	+-6.20e-005		
	114.27	4.02e-004	+-3.97e-005		
Pa-234	Average:	1.27e-005	+-6.84e-007	6.70e+000	5 of 10
	63.00	5.90e-005	+-3.39e-005		
	98.44	5.90e-005	+-2.14e-006		
	131.20	3.94e-006	+-1.18e-006		
	569.50	8.49e-006	+-1.38e-006		
	946.00	1.04e-005	+-1.22e-006		
Th-234	Average:	7.34e-003	+-1.73e-005	5.78e+002	3 of 3
	63.29	3.44e-003	+-2.90e-005		
	92.38	9.42e-003	+-3.02e-005		
	92.80	9.55e-003	+-3.06e-005		
Th-228	84.37	1.29e-003	+-6.42e-005	1.68e+004	1 of 2
U-235	Average:	3.71e-006	+-2.30e-007	6.17e+012	9 of 10
	89.95	2.32e-006	+-2.12e-005		
	93.35	2.27e-006	+-1.85e-005		
	105.00	1.42e-004	+-1.75e-005		
	109.14	5.34e-004	+-1.92e-005		
	143.76	2.28e-006	+-2.49e-006		
	163.35	2.02e-004	+-4.40e-006		
	183.72	2.29e-006	+-2.32e-007		

	202.12	9.70e-005 +-1.28e-005			
	205.31	2.00e-004 +-3.76e-006			
Ac-227	115.35	2.29e-003 +-2.26e-004	1.91e+005	1 of	1
Ra-226	186.10	2.98e-005 +-1.13e-007	1.40e+007	1 of	1
Pa-234m	Average:	6.12e-003 +-6.57e-005	1.95e-002	2 of	3
	766.41	6.32e-003 +-1.40e-004			
	1001.00	6.07e-003 +-7.43e-005			
K-40	1460.80	3.97e-006 +-1.39e-006	1.12e+013	1 of	1

TOTAL: 2.21e-002 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
43.37	187.27	5084	188	359	6475	1.78	1.997e+002
112.50	469.79	11882	230	413	9406	1.89	7.495e+001
120.54	502.64	1018	240	507	9142	1.33	5.988e+000
194.78	806.04	934	119	236	3080	1.18	4.838e+000
258.12	1064.87	1773	97	181	1643	1.29	1.061e+001
742.95	3046.25	829	62	115	604	1.59	1.277e+001
786.34	3223.56	533	52	97	452	1.71	8.676e+000
1193.95	4889.36	122	19	34	50	2.40	2.985e+000
1737.89	7112.29	130	14	15	9	1.82	4.594e+000
1831.71	7495.69	97	13	17	13	0.79	3.609e+000

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 040835 PIONEER A 5'-7'

Sample Size . . . . . 8.55e+002 g	Spectrum File . . h:\pcaspec\040835.spm
Sampling Start. 00-00-00 00:00	Counting Start. 03-10-04 12:51
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Bi-214	Average:	9.50e-007 +-3.57e-008	3.32e-001	3 of 10
	609.31	9.15e-007 +-3.91e-008		
	1120.30	1.11e-006 +-1.36e-007		
	1764.50	1.14e-006 +-1.16e-007		
Bi-211	351.07	2.78e-007 +-1.03e-007	3.55e-002	1 of 5
Ac-228	Average:	5.78e-007 +-5.01e-008	6.13e+000	3 of 10
	93.35	5.95e-007 +-5.32e-007		
	338.32	5.36e-007 +-8.69e-008		
	911.07	5.98e-007 +-6.17e-008		
Th-234	Average:	2.45e-006 +-4.83e-007	5.78e+002	2 of 3
	92.38	2.43e-006 +-6.79e-007		
	92.80	2.46e-006 +-6.88e-007		
Tl-208	Average:	1.77e-007 +-1.58e-008	5.09e-002	2 of 8
	510.84	1.87e-007 +-5.86e-008		
	583.14	1.77e-007 +-1.64e-008		
Pb-212	Average:	4.73e-007 +-2.58e-008	1.06e+001	3 of 6
	74.82	4.73e-007 +-1.84e-007		
	77.11	4.72e-007 +-1.38e-007		
	238.63	4.73e-007 +-2.66e-008		
Pb-214	Average:	8.38e-007 +-2.94e-008	4.47e-001	5 of 6
	74.82	6.12e-007 +-3.16e-007		
	77.11	8.09e-007 +-2.37e-007		
	241.98	8.39e-007 +-1.33e-007		
	295.21	8.40e-007 +-5.91e-008		
	351.92	8.40e-007 +-3.57e-008		
Ra-226	186.10	2.17e-008 +-3.29e-009	1.40e+007	1 of 1
Ra-224	240.98	6.01e-007 +-2.52e-007	8.69e+001	1 of 1

K-40	1460.80	1.30e-005 +-3.87e-007	1.12e+013	1 of 1

TOTAL: 1.94e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
43.28	186.90	356	51	95	552	1.36	1.405e+001

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 040836 PIONEER B 5'-7'

Sample Size . . . . . 8.64e+002 g	Spectrum File . . h:\pcaspec\040836.spm
Sampling Start. 00-00-00 00:00	Counting Start. 03-10-04 13:57
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Bi-214	Average:	9.36e-007 +-3.35e-008	3.32e-001	4 of 10
	609.31	9.20e-007 +-3.79e-008		
	727.17	4.84e-007 +-1.18e-007		
	1120.30	1.19e-006 +-1.33e-007		
	1764.50	1.37e-006 +-1.22e-007		
Ac-228	Average:	5.86e-007 +-4.57e-008	6.13e+000	4 of 10
	93.35	5.83e-007 +-6.69e-007		
	338.32	6.05e-007 +-1.00e-007		
	911.07	5.79e-007 +-6.16e-008		
	969.11	5.86e-007 +-9.43e-008		
Th-234	Average:	6.49e-006 +-5.32e-007	5.78e+002	3 of 3
	63.29	6.49e-006 +-1.10e-006		
	92.38	6.49e-006 +-8.55e-007		
	92.80	6.49e-006 +-8.66e-007		
Tl-208	Average:	1.84e-007 +-1.59e-008	5.09e-002	2 of 8
	510.84	1.90e-007 +-5.40e-008		
	583.14	1.84e-007 +-1.66e-008		
Pb-212	Average:	5.81e-007 +-2.57e-008	1.06e+001	3 of 6
	74.82	5.80e-007 +-2.05e-007		
	77.11	5.82e-007 +-1.42e-007		
	238.63	5.81e-007 +-2.63e-008		
Pb-214	Average:	9.35e-007 +-2.86e-008	4.47e-001	5 of 6
	74.82	6.29e-007 +-3.54e-007		
	77.11	9.44e-007 +-2.44e-007		
	241.98	9.46e-007 +-1.18e-007		
	295.21	9.45e-007 +-5.65e-008		
	351.92	9.32e-007 +-3.50e-008		

U-235	Average:	6.79e-007	+-1.18e-007	6.17e+012	2 of 10
	93.35	6.79e-007	+-5.22e-007		
	143.76	6.79e-007	+-1.21e-007		
Ra-226	186.10	7.24e-008	+-3.71e-009	1.40e+007	1 of 1
Ra-224	240.98	6.58e-007	+-2.23e-007	8.69e+001	1 of 1
K-40	1460.80	1.35e-005	+-3.88e-007	1.12e+013	1 of 1

TOTAL: 2.46e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
43.48	187.70	433	62	122	777	1.27	1.692e+001

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 040837 PIONEER C 4'-8'

Sample Size . . . . . 7.46e+002 g	Spectrum File . . H:\PCASPEC\040837.SPM
Sampling Start. 00-00-00 00:00	Counting Start. 03-10-04 15:04
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Bi-214	Average:	1.03e-006 +-3.82e-008	3.32e-001	3 of 10
	609.31	9.63e-007 +-4.13e-008		
	1120.30	1.11e-006 +-1.63e-007		
	1764.50	1.57e-006 +-1.27e-007		
Ac-228	Average:	6.03e-007 +-5.14e-008	6.13e+000	4 of 10
	93.35	5.87e-007 +-6.15e-007		
	338.32	5.93e-007 +-9.83e-008		
	911.07	5.85e-007 +-7.18e-008		
	969.11	6.61e-007 +-1.14e-007		
Th-234	Average:	2.80e-006 +-5.59e-007	5.78e+002	2 of 3
	92.38	2.78e-006 +-7.85e-007		
	92.80	2.82e-006 +-7.96e-007		
Tl-208	Average:	2.16e-007 +-1.82e-008	5.09e-002	2 of 8
	510.84	2.31e-007 +-6.49e-008		
	583.14	2.15e-007 +-1.89e-008		
Pb-212	Average:	5.91e-007 +-3.11e-008	1.06e+001	3 of 6
	74.82	5.92e-007 +-2.09e-007		
	77.11	5.90e-007 +-1.46e-007		
	238.63	5.91e-007 +-3.22e-008		
Pb-214	Average:	9.81e-007 +-3.25e-008	4.47e-001	5 of 6
	74.82	4.49e-007 +-3.59e-007		
	77.11	7.41e-007 +-2.50e-007		
	241.98	1.00e-006 +-1.19e-007		
	295.21	1.00e-006 +-6.35e-008		
	351.92	9.84e-007 +-4.06e-008		
Ra-226	186.10	1.85e-008 +-3.42e-009	1.40e+007	1 of 1
Ra-224	240.98	6.73e-007 +-2.26e-007	8.69e+001	1 of 1

K-40	1460.80	1.38e-005 +-4.31e-007	1.12e+013	1 of 1

TOTAL: 2.07e-005 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
43.26	186.81	299	46	86	479	1.59	1.182e+001

RSSI High Resolution Gamma Spectroscopy Analysis

Quantum Technology
GDR_C Nuclide Activity Summary

Sample ID: 040838 PIONEER D 4'-8'

Sample Size . . . . . 1.08e+003 g	Spectrum File . . h:\pcaspec\040838.SPM
Sampling Start. 00-00-00 00:00	Counting Start. 03-10-04 16:13
Sampling Stop 00-00-00 00:00	Buildup Time. . . . . 0.00e+000 Hrs
Current Date. 00-00-00 00:00	Decay Time [OFF]. . . . . 0.00e+000 Hrs
Efficiency File.h:\gdr\eff\500mar.eff	Library File. . .H:\GDR\LIB\NUTHACK.LIB
ID. . . . . .sn	ID. . . .U, Th, & Ac Natural Series + K
Eff.= 1/[7.40e-002*En^-2.40e+000 + 7.40e+001*En^9.80e-001]	02-23-04 17:00
Gamma Fraction Limit >= . . . 10.00 %	Decay Limit <=. . . . 8.000 Halflives
Library Energy Tolerance. . . 1.20	

FINAL ACTIVITY REPORT

Nuclide	Energy (keV)	Conc +- 1.00sigma (uCi/g)	Halflife (hrs)	Peaks Found
Bi-214	Average:	8.03e-007 +-2.94e-008	3.32e-001	4 of 10
	609.31	7.72e-007 +-3.42e-008		
	727.17	4.69e-007 +-9.79e-008		
	1120.30	8.15e-007 +-1.18e-007		
	1764.50	1.28e-006 +-8.97e-008		
Ra-223	83.78	5.41e-007 +-1.16e-007	2.74e+002	1 of 10
Ac-228	Average:	5.11e-007 +-4.05e-008	6.13e+000	3 of 10
	338.32	5.48e-007 +-8.30e-008		
	911.07	5.13e-007 +-5.48e-008		
	969.11	*4.64e-007 +-8.76e-008*		
Th-231	84.21	2.07e-006 +-4.46e-007	2.55e+001	1 of 6
Th-234	Average:	3.42e-005 +-8.24e-007	5.78e+002	3 of 3
	63.29	3.42e-005 +-1.44e-006		
	92.38	3.42e-005 +-1.41e-006		
	92.80	3.42e-005 +-1.43e-006		
Tl-208	Average:	1.66e-007 +-1.33e-008	5.09e-002	3 of 8
	84.90	1.59e-007 +-1.89e-006		
	510.84	2.00e-007 +-5.29e-008		
	583.14	1.64e-007 +-1.38e-008		
Pb-212	238.63	4.55e-007 +-2.44e-008	1.06e+001	1 of 6
Pb-214	Average:	7.22e-007 +-2.57e-008	4.47e-001	3 of 6
	241.98	7.22e-007 +-1.11e-007		
	295.21	7.22e-007 +-5.03e-008		
	351.92	7.22e-007 +-3.11e-008		
Th-228	84.37	1.10e-005 +-2.38e-006	1.68e+004	1 of 2
U-235	Average:	1.84e-006 +-1.03e-007	6.17e+012	4 of 10
	93.35	7.30e-007 +-8.61e-007		

	143.76	1.81e-006 +-1.31e-007			
	163.35	2.17e-006 +-2.74e-007			
	205.31	1.77e-006 +-2.17e-007			
Ra-226	186.10	2.84e-007 +-4.51e-009	1.40e+007	1 of	1
Ra-224	240.98	5.02e-007 +-2.11e-007	8.69e+001	1 of	1
Pa-234m	Average:	7.35e-005 +-2.93e-006	1.95e-002	2 of	3
	766.41	9.35e-005 +-7.30e-006			
	1001.00	6.96e-005 +-3.20e-006			
K-40	1460.80	1.25e-005 +-3.46e-007	1.12e+013	1 of	1

TOTAL: 1.39e-004 uCi/g

UNKNOWN PEAKS

Energy (keV)	Centroid Channel	Net Counts	Un-Certainty	C.L. Counts	Bkg. Counts	FWHM (keV)	Net Gamma/sec
43.27	186.86	848	77	144	1272	1.31	3.349e+001
112.83	471.10	872	128	258	3344	1.00	5.483e+000

Glossary

Glossary

Alpha emitter: a radionuclide that decays by emitting an alpha particle, resulting in a reduction of the atomic mass by 4 and the atomic number by 2.

Alpha particle: a high speed, heavy particle (equivalent to a helium nucleus: 2 protons and 2 neutrons); the most energetic form of ionizing radiation.

Beta emitter: A radionuclide whose decay is accompanied by the emission of beta particles, resulting in an increase of the atomic number by 1 and no change in atomic mass.

Beta particle: high energy electron emitted by a decaying nucleus.

Counts per minute (cpm): the signal rate detected by an ionizing radiation survey instrument. The instrument's sensitivity and efficiency determine the number of counts resulting from the amount of radioactive material present.

Curie (Ci): quantity of radioactive material which decays at the rate of 3.7×10^{10} disintegrations (transformations) per second (dps or tps).

Daughter: A nuclide formed by the radioactive decay of a parent radionuclide.

Disintegrations per minute (dpm): the number of atoms of a radioactive material decaying per minute.

Exposure: The amount of ionizing radiation present in air produced by x- or gamma-ray radiation. The special unit is the roentgen (R). The SI unit of exposure is the coulomb per kilogram (C/kg).

Gamma radiation: Electromagnetic radiation of high energy. Gamma radiation frequently but not always accompanies alpha or beta radiation.

Isotope: Atoms of an element that have the same number of protons but a different number of neutrons, and therefore different atomic mass. The isotope number is the atomic mass.

Irradiation: material subject to ionizing radiation. Irradiated reactor fuel and components have been subject to neutron irradiation and hence become radioactive themselves.

Lower Limit of Detection (LLD): the smallest numerical data point that can be detected with a specified probability.

Millirem (mrem): 10^{-3}, or one thousandth of a rem

Millirep(mrep): 10^{-3}, or one thousandth of a rep

Milliroentgen (mR): 10^{-3}, or one thousandth of a roentgen

Minimal Detectable Activity (MDA): the smallest amount of activity that can be quantified.

Mitigation: action taken to permanently eliminate or reduce the risk to human life, property, and function from hazards.

Natural uranium: Uranium with an isotopic composition as found in nature.

Photons: discrete packets (or units) of electromagnetic energy.

picoCurie (pCi): 10^{-12}, or a trillionth of a curie, equal to approximately 2.2 disintegrations per minute

pCi/g: picoCuries per gram, a measure of radioactive concentration, i.e. the amount of a radionuclide (in picoCuries) per unit weight (in grams) of the material containing the radionuclide.

Pyrophoric: will ignite spontaneously or emits sparks when rubbed, scratched, or struck.

Radionuclide: A radioactive nuclide; an unstable isotope of an element that decays or disintegrates spontaneously, emitting radiation.

Rad: the special unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs per gram.

Rem: the special unit of any of the quantities expressed as dose equivalent. The dose equivalent in rem is equal to the absorbed dose in rad multiplied by the quality factor.

Roentgen equivalent physical (Rep): the quantity of radiation which, when absorbed in the body, would deposit the same amount of energy as 1 roentgen of photon radiation.

Roentgen (R): the amount of x-radiation or gamma radiation that produces ionization equal to 1 electrostatic unit of charge, either

negative or positive, in 1 cubic centimeter of dry air at 0°C and at standard atmospheric pressure.

Uranium (U): the heaviest naturally occurring element in the earth's crust, exists as three isotopes in the following percentages by weight: U-238, 99.27%; U-235, 0.72%; and U-234, 0.0055%; by activity: U-238, 48%; U-234, 50%; and U-235, 2%.

ATTACHMENT G – Map of Local Area

Churches
Hospitals
Schools
Recreational Facilities
Roads (labeled)
2003 NAIP Aerial Photos

ATTACHMENT H – Argonne National Lab Document Search

Records Review and Evaluation Report for the Joslyn Manufacturing Site, Fort Wayne, Indiana

Prepared by

Environmental Assessment Division
Argonne National Laboratory
9700 South Cass Avenue
Argonne, IL 60439

for

U.S. Army Corps of Engineers
Buffalo District
1776 Niagara Street
Buffalo, New York 14207

May 2005

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FIGURES

1 BACKGROUND

The former Joslyn Manufacturing and Supply Company Site in Fort Wayne, Indiana, processed uranium materials for the Manhattan Engineer District (MED) and U.S. Atomic Energy Commission (AEC) from 1943 through 1949, and uranium processing continued through the early 1950s to supply material to Great Britain. The site was used to convert uranium billets into rods for irradiation in nuclear reactors, mainly the plutonium production reactors at the Hanford Site in the state of Washington. The billets were received by rail, and small furnaces were used to heat the material. Three mills and various metal processing equipment were used to produce the rods, and an outdoor area was used to burn waste.

The initial contract for uranium processing operations was with the University of Chicago. The primary operations performed at the Joslyn Manufacturing Site involved heating, hot rolling, quenching, straightening, cooling, grinding, abrasive cutting, waste burning, and threading of uranium rods. The contract with the University of Chicago was terminated in 1946, and subsequent uranium manufacturing operations for domestic uses were performed under a contract with the AEC. Most of the uranium processed at the site was natural uranium, i.e., it contained uranium isotopes in their naturally occurring ratios.

The Joslyn Manufacturing Site was purchased by Slater Steel Corporation in 1981, and the site was used to manufacture stainless steel and alloy bars and billets. Prior to a pending sale of this site to Fort Wayne Steel Corporation, a focused radiological survey was conducted by Radiation Safety Services, Inc. (RSSI) in 2004, which identified several areas of elevated radioactive contamination. These levels were higher than indicated in a previous radiological survey conducted by Oak Ridge National Laboratory (ORNL) in 1976.

Under a Memorandum of Understanding between the U.S. Department of Energy (DOE) and the U.S. Army Corps of Engineers (USACE), the DOE is responsible for reviewing the history and current status of sites formerly used to support MED and AEC programs and activities, and for performing a determination of eligibility for inclusion in the Formerly Utilized Sites Remedial Action Program (FUSRAP). The FUSRAP was created in 1974 to address conditions at sites that were used to support programs and activities of the MED and AEC, and that have contamination levels exceeding current regulatory requirements. After DOE completes the eligibility determination, responsibility for action is transferred to USACE. The DOE notified USACE on August 26, 2004, that the Joslyn Manufacturing Site would be eligible for inclusion in FUSRAP if USACE determined that remedial action was required to address FUSRAP-related contamination at the site. The DOE had previously considered this site as a candidate for remedial action under FUSRAP, but eliminated it from further consideration, since the reported levels of contamination did not warrant remedial action. Recent radiological surveys have identified higher levels of contamination than previously reported.

The USACE is responsible for performing a Preliminary Assessment (PA) at the Joslyn Manufacturing Site under authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). A review and evaluation of existing records were performed to ensure that all available historical information was considered in development of the PA. The scope of this report is limited to a compilation and review of existing records for the Joslyn Manufacturing Site from DOE, the National Archives and Records Administration (NARA), the University of Chicago, Argonne National Laboratory (ANL), and the Indiana Department of Transportation (DOT).

2 SITE DESCRIPTION

2.1 SITE LOCATION AND BRIEF DESCRIPTION

The Joslyn Manufacturing Site is located in an industrial setting in Fort Wayne, Allen County, Indiana, about 3 km (2 mi) southwest of the city's downtown business district (Figure 1). The site is located at 2302 Taylor Street West (Fort Wayne Steel Corporation) and 2400 Taylor Street West (Valbruna Slater Steel Corporation), about 1 km (0.6 mi.) west of the St. Mary's River. The site is bordered by the Norfolk and Southern Railroad to the north, commercial properties to the east, Taylor Street West to the south, and a drainage ditch (Junk Ditch) to the west. Several residential, commercial, and industrial business areas border the site.

The DOE previously concluded that the site should not be included in FUSRAP largely based on the results of a radiological survey performed by ORNL in 1976. The layout of the site at the time of this survey is shown in Figure 2. This figure also indicates the locations of various uranium processing operations conducted at the site by letters A to J. However, the Joslyn Manufacturing Site has undergone considerable development since uranium processing activities were completed; only three of the buildings shown in Figure 2 (Buildings 3, 6, and 7) were present during the time that activities were performed for the MED and AEC (Fallon 1979). The current status of the site and buildings is being evaluated as part of the ongoing PA.

2.2 PREVIOUS RADIOLOGICAL SURVEYS

As noted in discussions with individuals familiar with the historical records and documents for this site (notably Donald MacKenzie, who oversees the DOE FUSRAP Library), the most relevant information for preparation of the PA is included in the previous radiological surveys performed at the Joslyn Manufacturing Site. Four radiological surveys have been documented, and these are summarized as follows.

The first survey was performed by A.R. Piccot of the AEC Health and Safety Laboratory, on August 1, 1949 (Piccot 1949). This survey was performed after all uranium processing operations for the MED and AEC had been completed, but prior to completion of cleanup activities. The Joslyn Manufacturing Site was reportedly used to process uranium for Great Britain for several years following completion of AEC activities, and this processing would have occurred after this radiological survey. Thus, the results of this survey are of limited value. Extensive contamination and elevated radiation levels were found to be present in buildings at the site, which would be expected. A good summary of the information obtained from this survey is included as Table 1 of the radiological survey report prepared by RSSI in 2004; this report is discussed below. Alpha contamination levels were reported as high as 20,000 to 30,000 disintegrations per minute (dpm) at several locations, and beta-gamma radiation levels were reported to range up to 20 millirad per hour (mrad/hr).

The second survey was performed on October 23, 1976, by H.W. Dickson of the Heath and Safety Research Division at ORNL and W.T. Thornton of the Energy Research and Development Administration (ERDA), Oak Ridge Operations Office (ORNL 1980). A complete walkthrough survey was performed with numerous radiation measurements made in each of the Areas A through J involved in the uranium processing operations (see Figure 2). Measurements were made of alpha and beta-gamma activities (fixed and removable) and the gamma exposure rates. The measurements were generally comparable to background, with a few isolated spots showing low levels of alpha and beta-gamma

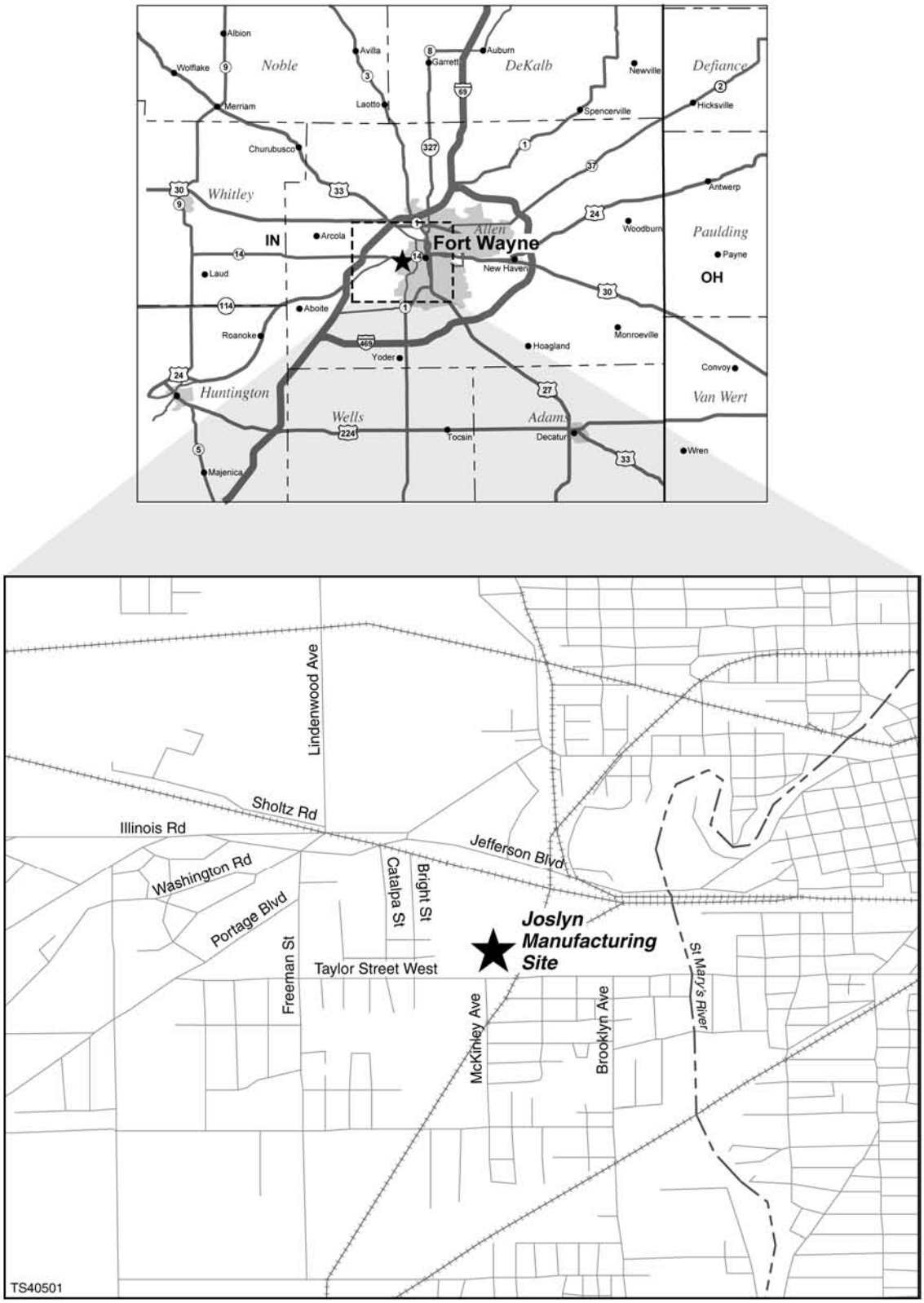

FIGURE 1 Location of Joslyn Manufacturing Site, 2302 and 2400 Taylor Street West, Fort Wayne, Indiana

FIGURE 2 Layout of the Joslyn Manufacturing Site (Source: Modified from ORNL [1980])

contamination. The maximum alpha reading was 300 dpm per 100 square centimeters (dpm/100 cm^2) on a wall in Area F, and the maximum beta-gamma reading was 0.1 mrad/hr at a location in Area B. No removable contamination was noted, and the average gamma radiation level ranged from 6 to 8 microRoentgen per hour (μR/hr), which is comparable to the background value for this area.

This survey concluded that there was no radioactivity of significance at the site. In addition, since uranium accountability procedures required the return to AEC of any uranium cutting and grinding residues or oxide scale that was generated in the processing activities, it was considered unlikely that pockets of radioactivity could exist under new concrete surfaces that would be of potential health and safety consequence. As a result, it was recommended that no additional radiological surveys were needed for this site (Thornton 1977). This survey formed much of the basis for not including this site in FUSRAP at that time (Fiore 1987). The 1977 memorandum from Mr. Thornton also noted that the work done at the Joslyn Manufacturing Site was similar to that performed at the Simonds Saw and Steel Site in Lockport, New York, but on a smaller scale.

The third survey was performed by RSSI in February and March of 2004 (RSSI 2004). Although the scope of this survey was indicated as being limited, it appears to have been much more thorough than either of the first two surveys. In addition to surveying the building interiors, samples were collected from ten boreholes (six at outdoor locations and four in the Processing Building) to evaluate the likelihood for subsurface contamination. Only one borehole (borehole D in the Processing Building) had a significantly elevated concentration of uranium; the concentration of total uranium from a sample collected from this borehole was 75.6 picocuries per gram (pCi/g). The total uranium concentrations from samples collected from the other nine boreholes were all less than 8 pCi/g, with seven boreholes being less than 4 pCi/g. This indicates that some isolated pockets of subsurface uranium contamination are present at the site, including below the floor of the Processing Building.

The Processing Building survey was conducted in a manner similar to that performed by ORNL in 1976, but benefited from the knowledge of a current employee who identified the locations of the machines used for uranium work. A gamma walkover survey was performed, and alpha and beta measurements were performed at locations having above-background gamma readings. Removable contamination was measured by collecting wipe samples from areas where alpha and beta measurements were elevated. The background gamma reading was indicated as 3,000 to 5,000 counts per minute (cpm), and elevated readings were identified at six locations in the Processing Building, with the maximum reported value being 80,000 cpm. Only four locations were identified as having elevated alpha contamination levels, and three as having elevated beta levels. The alpha and beta background concentrations were reported as 11 and 3,700 dpm/100 cm^2, respectively, and the maximum measured values were 2,632 dpm/100 cm^2 (alpha) and 1,111,000 dpm/100 cm^2 (beta). Very little removable contamination was identified, except for that inside of a pipe containing a rag in the Processing Building and at the threshold of a door. The pipe had the highest levels of removable contamination, with reported values of 206.6 dpm/100 cm^2 (alpha) and 550.9 dpm/100 cm^2 (beta).

Four bulk samples were collected from the Processing Building, including the rag stuffed into the pipe and samples from two other locations; two of the bulk samples were obtained at one location (the concrete stoop of a doorway in the north wall of the Processing Building). The rag was determined to have a total uranium concentration of 176 pCi/g, and the other three samples had total uranium concentrations ranging from 6,420 to 17,900 pCi/g. The reported ratios of uranium-235 to uranium-238 in these bulk samples are typical of those for natural uranium. The report concluded that there is uranium contamination at the site in excess of acceptable values, and that attenuation by soil, concrete, debris, oil, or other material may be masking additional significant contamination. Removable contamination was speculated to be low, because much of the contamination has been fixed by paint and other surface

coatings. The extent of contamination was stated as being unknown, and could be determined only by a more comprehensive survey of the buildings and the soil beneath and outside of the buildings.

The fourth survey was performed by Science Applications International Corporation (SAIC) in January 2005 to evaluate the potential radiation doses to individuals operating equipment within the North-South Bay of the Processing Building (SAIC 2005). Six new areas of elevated contamination were identified, in addition to the three locations of radioactive contamination in the Processing Building identified in the RSSI survey. All locations appear to be small isolated areas of fixed surface contamination, and this survey did not identify the presence of removable contamination. Seven of the locations are on the concrete floor, one is at the base of a vertical steel beam, and one is on the horizontal surfaces of an overhead beam. The contamination appears to be largely associated with beta activity; only one measurement (on the vertical steel beam) had elevated levels of alpha activity. This beta activity is likely associated with the short-lived radioactive decay products of uranium-238 (thorium-234 and protactinium-234m) and uranium-235 (thorium-231).

The measured average gamma exposure rate in the North-South Bay was determined to be indistinguishable from the average background exposure rate of 5 μR/hr for this location. An assessment was performed of the risk to workers associated with the radioactive contamination in the North-South Bay. Using conservative assumptions, an annual dose of 0.02 mrem/yr was estimated to an equipment operator in this area. This is a very small fraction of the annual dose from background radiation (estimated to be about 300 mrem/yr), and well below any regulatory limit. Hence, it was concluded that the fixed equipment in this area could be operated with negligible risk to personnel due to exposure to radioactive material when compared to other industrial hazards in any work environment.

3 APPROACH AND RATIONALE

The approach and rationale used to conduct this records compilation and review are described as follows. The approach consisted of two activities. The first activity was to determine which reports and records were already available for use and the locations of these documents. This information was obtained and reviewed to identify additional sources of records for the site. The second activity consisted of contacting organizations that may have additional records for the site, and meeting with them to determine if such information was available.

3.1 U.S. DEPARTMENT OF ENERGY

Since DOE has responsibility for the FUSRAP eligibility determination, Donald MacKenzie in the DOE Office of Environmental Management (EM) was contacted to ascertain the status of documents and records associated with this site. Mr. MacKenzie, who is responsible for maintenance of the DOE FUSRAP Library in Germantown, Maryland, indicated that the first place to check was the Considered Sites Database, which can be accessed at http://csd.apps.em.doe.gov. This database provides the status of sites being evaluated for consideration in FUSRAP, and gives the key documents supporting that determination. This database was accessed on March 8, 2005, and seven documents were identified as supporting DOE's determination of eliminating this site from consideration in FUSRAP.

Mr. MacKenzie also indicated that he had compiled a list of all documents included in the DOE FUSRAP Library for the Joslyn Manufacturing Site, and he provided that list on March 8. Mr. MacKenzie noted that the list of documents and records included in the DOE FUSRAP Library may not be complete, and that it would be necessary to contact the National Archives and Records Administration (NARA) and other records sources to obtain a complete list of the records and reports for this site. The DOE records search activity performed as part of the eligibility determination was quite thorough, but may not have been exhaustive. Sufficient records and reports were obtained by DOE to support a determination of inclusion or exclusion from FUSRAP. The goal of that activity was not necessarily to develop a complete list of all records and reports for this site. The seven documents identified in the Considered Sites Database were included in the more complete list provided by Mr. MacKenzie. This list included 42 records and reports.

The list of documents provided by Mr. MacKenzie was compared with the records already in the possession of the USACE Buffalo District for this site. A copy of all records and reports maintained by the Buffalo District for the Joslyn Manufacturing Site was provided on a compact disk (CD) on March 17. (The recently completed SAIC radiological survey report was provided separately.) These records and reports are listed in Attachment 1 to this report. All of the records and reports included in the DOE FUSRAP Library were on the CD, indicating that the Buffalo District already has all of the reports maintained by DOE for this site. Hence, there is no need to contact DOE further in this regard.

3.2 NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

NARA maintains a number of regional offices as well as an office in Washington, DC (actually College Park, Maryland). Records associated with previous MED and AEC activities at the Joslyn Manufacturing Site would most likely be maintained at the Great Lakes Region office located at 7358 South Pulaski Road in Chicago, Illinois. This office was contacted for information, and a response was provided on March 15 by Glenn Longacre, an archivist at that office. Mr. Longacre indicated that he had used finding aids and examined the following record groups (RGs) for information on the Joslyn Manufacturing and Supply Company Site:

RG 77, Records of the Office of the Chief of Engineers,
RG 103, Records of the Farm Credit Administration,
RG 156, Records of the Office of the Chief of Ordnance,
RG 270, Records of the War Assets Administration, and
RG 291, Records of the Federal Property Resource Service.

Mr. Longacre indicated that he could find no reference in these finding aids relating to the Joslyn Manufacturing and Supply Company. He noted that he also examined RG 21, Records of District Courts of the United States, and found numerous civil cases involving the company from the 1950s and 1960s. This confirms that the name used in the records search activity at this regional NARA office was a valid means of looking for information on this site. Discussions with staff at this office indicated that records associated with MED and AEC also could be maintained at the NARA office in College Park, Maryland, so that office should be contacted as well.

A visit was made to the NARA Great Lakes Region office on April 19 to discuss the records review process conducted for this site. At this meeting, Mr. Longacre provided a booklet entitled, *Guide to Records in the National Archives – Great Lakes Region*, which summarizes the information contained within each RG at the Great Lakes Region facility. Mr. Longacre also provided the finding aids, contained in three-ring binders, that he used to conduct his records search. A note dated June 30, 1981, was included in the finding aid for RG 326, Records of the Atomic Energy Commission, that Edward Vierzba of The Aerospace Corporation be contacted relative to the types of information on contractors supporting the AEC, as identified in records contained within this RG. The Aerospace Corporation was the organization supporting DOE in the 1970s and 1980s on the FUSRAP eligibility determination process. This implies that DOE already had compiled the information in this RG for potential FUSRAP sites.

After looking through these finding aids, several additional boxes were identified for review. These boxes were obtained by Mr. Longacre, and they were checked for information on the Joslyn Manufacturing Site. No reference to this site could be found in these records. Based on the records search conducted by Mr. Longacre and the information he provided during the subsequent visit, and the note in RG 326 indicating that DOE had already obtained relevant information from this NARA office, it was concluded that there was likely no additional information for the Joslyn Manufacturing Site in the NARA Great Lakes Region office.

A visit was made on April 6 to the NARA Washington, DC, office located at 8601 Adelphi Road in College Park, Maryland. Following a meeting with archivists responsible for the MED and AEC collections, the archivists recommended the use of specific finding aids, which was similar to the approach used by Mr. Longacre in the Great Lakes Region office. A finding aid was used to search records in RG 77 for information on MED. One useful tool in this finding aid is an inventory established for MED for classified and unclassified information. This finding aid — Manhattan Engineer District, General Correspondence Files — was reviewed, and no reference to the Joslyn Manufacturing Site was identified. The General Correspondence Files are organized according to a 1943 War Department Decimal File System, and the review focused on the following decimal file systems:

No. 319, Miscellaneous,
No. 330, Military Control,
No. 334, Boards, Commissions, Committees, Councils, and Missions, and
No. 400, Supplies, Services, and Equipment.

In addition, a box was located in RG 77 for Indiana University, and the information in the box was reviewed to ascertain if there was any mention of the Joslyn Manufacturing Site. No mention could be found of this site in the records contained in that box.

The finding aid was also used to review RG 326 for information on the AEC. No reference was found for the Joslyn Manufacturing Site in this finding aid. The finding aid made reference to the Metallurgical Laboratory, University of Chicago, Indiana University, and ANL. Access to many of the records in RG 326 is restricted, so they could not be reviewed for information pertinent to the Joslyn Manufacturing Site during this visit. A request was made for a box containing unclassified information associated with the Metallurgical Laboratory, but the box had been removed for an internal report, and the clerks did not know when it would be returned. Since additional records search activities are being performed for the Metallurgical Laboratory, University of Chicago, and ANL using more direct sources, and since there was no direct involvement of Indiana University with the activities conducted at the Joslyn Manufacturing Site, there did not seem to be a pressing need to pursue this information request further, specifically to locate this box.

Aerial photographs of Allen County, Indiana, for 1939 and 1951 were located in RG 145, Records of the Agricultural Stabilization and Conservation Service. The Joslyn Manufacturing Site was located on the photographs for these two years (it is included on several overlapping frames). The site is clearly visible in the 1951-era photographs, and is identifiable (but to a lesser degree) in the 1939 photographs. Both flyovers were published by the U.S. Department of Agriculture; the mission and frames for the 1939 photos are BEU-2-78, BEU-2-79, and BEU-2-80. For those taken in 1951, the mission and frames are BEU-2H-92 and BEU-2H-93. Copies of these pictures can be obtained and used in future CERCLA documentation, if appropriate.

Many of the records in the NARA files that were reviewed appeared to be organized by the names of specific individuals, and not organizations. The reports and records previously provided by the Buffalo District were reviewed to identify the names of certain key individuals and activities conducted at the site. The NARA facility in College Park, Maryland, was revisited on April 18, and additional searches were performed for records in RG 77 using this information. No reference was identified for the Joslyn Manufacturing Site in the records reviewed during this second visit. Five AEC files having access restrictions were identified in RG 326, and a follow-on visit was made to review these records by an individual having an appropriate security clearance. No reference to the Joslyn Manufacturing Site was identified in these records during this visit.

Based on the review of records at these two NARA facilities and meetings with personnel at these offices, it was concluded that there was no relevant information for the Joslyn Manufacturing Site maintained by NARA. While this review was not exhaustive, it was sufficiently complete to support this determination. A complete search of potential records maintained by NARA for information on the Joslyn Manufacturing Site could take months and would likely not produce any records that would support preparation of the PA.

3.3 UNIVERSITY OF CHICAGO

The University of Chicago maintains some records associated with activities performed by the Metallurgical Laboratory for the MED and AEC. The Metallurgical Laboratory was the predecessor of ANL. The first contract with the Joslyn Manufacturing Site for production of uranium rods was with the University of Chicago and extended from August 15, 1943, through June 30, 1946. The Metallurgical Laboratory may have provided some technical oversight of this contract, which was terminated in 1946

by reason of normal expiration. Information on this contract was included in the records provided by the Buffalo District on March 17.

Records associated with activities conducted by the Metallurgical Laboratory are maintained in the Special Collections Research Center located in the Joseph Regenstein Library at the University of Chicago. The Regenstein Library is located at 1100 East 57th Street in Chicago, Illinois. A request was sent to the Special Collections Research Center for information on the Joslyn Manufacturing and Supply Company Site on April 1. The request was made over the Internet using the procedure and form included on the website at http://www.lib.uchicago.edu/e/spcl/using/reference/ask.html. The Center replied on April 4, acknowledging receipt of the request and indicating that a reply would be provided as soon as possible.

A more detailed response was received on April 13 from David Pavelich, a reference and instruction librarian in the Special Collections Research Center. Mr. Pavelich noted that the University had very little information on the MED or Metallurgical Laboratory, and that records related to the scientific work of that period were considered classified government property and were removed from the campus by the military at the end of World War II. Those that have since been declassified would be available in NARA (Great Lakes Region and Washington, DC). The University of Chicago has some restricted administrative files relating to contracts managed by the University during this time period, but access to these files requires the prior written approval of the University Office of Legal Counsel. Since these files would not contain the types of information useful for an assessment of site conditions, no effort was made to review them. The reply from David Pavelich indicated that the Presidents Papers or Board of Trustees minutes could be consulted for information, but that these sources would not likely contain information on the Joslyn Manufacturing Site.

A visit was made on April 20 to the Special Collections Research Center, and the information request was discussed with David Pavelich and Eileen Ielmini, the head processing archivist at the Center. Ms. Ielmini provided the index files for the Presidents Papers and Board of Trustees minutes. These files were reviewed, and a request was made to examine several files in the Board of Trustees minutes. These files did not contain any reference to the Joslyn Manufacturing Site. The visit confirmed that the Special Collections Research Center contained very little documentary information on the MED and Metallurgical Laboratory. Based on the discussions with David Pavelich and Eileen Ielmini and a review of selected files in the Board of Trustees minutes, it was concluded that no records for the Joslyn Manufacturing Site were likely available in the accessible files at the University of Chicago.

The Special Collections Research Center website indicated that researchers desiring information on the Metallurgical Laboratory should consult NARA (Great Lakes Region and Washington, DC), as well as related material held by ANL. Based on this information, the records review effort was expanded to include a search of records at ANL.

3.4 ARGONNE NATIONAL LABORATORY

The Argonne Central Library (located in Building 203) is the central repository for reference information at the Laboratory. This library was visited on April 4, and an information request was discussed with Susan Pepalis, a librarian at this facility. She performed several electronic records searches, and was not able to identify any documents for the Joslyn Manufacturing and Supply Company Site. She identified several reports and documents discussing the Metallurgical Laboratory, including the journal of Dr. Glenn T. Seaborg. These records were obtained and reviewed, and no mention of the Joslyn Manufacturing Site was identified in these documents.

Subsequent communication with Ms. Pepalis on April 6 indicated that the Argonne Central Library had a large number of reports from the Metallurgical Laboratory. These reports were generally scientific publications, lecture notes, and progress reports, and were maintained on microcards or microfiche. These reports were not included in any searchable database, which was the reason they were not identified in the first electronic records search. These reports are identified in a card catalog maintained at the Central Library. This card catalog was reviewed, and six reports were selected for follow-on investigation. These reports addressed uranium processing research and development activities at the Metallurgical Laboratory during the time period that the Joslyn Manufacturing Site had the contract with the University of Chicago. These reports were expected to be typical of those prepared by the Metallurgical Laboratory.

Susan Pepalis obtained these reports on microcard, and they were reviewed on April 8. No mention was made of the Joslyn Manufacturing Site in these six documents. As expected, these were short scientific and progress reports, and did not discuss large-scale uranium manufacturing activities such as those conducted at the Joslyn Manufacturing Site. Based on the length of time that it would take to search these records and the very small likelihood of obtaining any useful information, a decision was made to conclude the records review effort at ANL at this point. This resource could be checked in more detail in the future, if conditions should change.

3.5 STATE OF INDIANA DEPARTMENT OF TRANSPORTATION

The Indiana Department of Transportation (DOT) was contacted on April 8 to determine the availability of information on the Joslyn Manufacturing Site. The Indiana DOT Central Office is located in Indianapolis, and a district office is located in Fort Wayne; each office was contacted separately. Todd Johnson, the acting director of the Fort Wayne District Office, offered to perform a records review of their files and provide the results of this survey when complete. Individuals in both offices indicated a willingness to assist in this records review, although neither office indicated that useful information on this site was likely to be obtained. However, the Indiana DOT has aerial photographs that may assist in the preparation of CERCLA documentation for this site.

The Aerial Photography Laboratory of the Indiana DOT Central Office, Division of Systems Technology, was visited on April 21. This laboratory is located at 100 North Senate Avenue in Indianapolis. The Joslyn Manufacturing Site was discussed with Stephen Ashby and William Kelly, and they provided the most recent aerial photographs of Allen County. Photographic flyover surveys are generally conducted by the state of Indiana approximately every ten years. The 1976 and 1989 photographs were reviewed, and images containing the Joslyn Manufacturing Site were located on both surveys. Copies of these photographs were ordered and have been received.

Photographs from flyovers conducted prior to the mid-1970s are stored in the State Archives at 6440 East 30th Street in Indianapolis. This office was also visited on April 21, and discussions with staff at this facility indicated that aerial flyovers of Allen County were performed on September 24, 1938; December 16, 1957; July 4, 1964; and June 10, 1972. Photographs that include the Joslyn Manufacturing Site were located for three of the four flyovers; information for the 1972 flyover was missing. Rick Applegate, the State Records Analysis/County Liaison, stated that negatives were available for the other three flyovers. Detailed photographs containing enlarged images of the Joslyn Manufacturing Site were ordered for the three available years, and those have also been received.

Other than the aerial photographs, no additional information describing the historical uranium processing activities at the site was identified. Todd Johnson in the Fort Wayne District Office conducted a search of their files, but no information on the site was located.

4 RECORDS REVIEW SUMMARY

The reports and records associated with the Joslyn Manufacturing Site were entered into an Excel spreadsheet and are listed in Attachment 1. This spreadsheet was largely developed from the information provided on a CD by the Buffalo District. This CD contained all of the records maintained by DOE in the FUSRAP Library in Germantown, Maryland. Attachment 1 indicates the type of record (report, letter, memorandum), organization (AEC, DOE, ERDA), title, author, and date. No additional records and reports beyond those already in the possession of the Buffalo District were identified in this records compilation and review effort, other than several aerial photographs of the site and vicinity from NARA and Indiana DOT. Based on the small number of records associated with this site, a decision was made to not convert them to a searchable electronic format.

Consistent with the information provided by Donald MacKenzie, the most relevant information for preparation of a PA is associated with the previous radiological surveys. Of these four surveys, the information in the two most recent surveys (performed within the past two years) is most appropriate. No additional historical records were identified that contained technical information that would assist in an initial assessment of site conditions. In fact, some of the previous information is inaccurate and misleading. In particular, the first radiological survey (Piccot 1949) was performed before completion of uranium processing activities at the site and subsequent decontamination of equipment and structures, and the second survey (ORNL 1980) was not sufficiently thorough to identify small pockets of radioactive contamination at the site.

The review of available records at NARA (Great Lakes Region and Washington, DC), the University of Chicago, ANL, and Indiana DOT did not identify any additional information on uranium processing activities at this site. In addition, discussions with staff at these facilities indicated that it was very unlikely that additional site information would be obtained from a more thorough investigation of available records.

5 REFERENCES

Fallon, J.M., 1979, Letter from Joseph M. Fallon (Director of Manufacturing, Joslyn Stainless Steels, Fort Wayne, Indiana) to Mr. Andrew Wallo III (Environmental Controls and Analysis Directorate, Eastern Technical Division, The Aerospace Corporation) with attachment, October 9.

Fiore, J.J., 1987, Letter from James J. Fiore (Director, Division of Facility and Site Decommissioning Projects, Office of Nuclear Energy, U.S. Department of Energy) to Mr. Joseph M. Fallon (Director, Engineering Services, Slater Steels Corporation, Fort Wayne, Indiana), October 13.

ORNL (Oak Ridge National Laboratory), 1980, *Preliminary Survey of Joslyn Stainless Steel Company*, *Fort Wayne*, *Indiana*, prepared by Health and Safety Research Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee, for U.S. Department of Energy, Formerly Utilized Sites Remedial Action Program, March.

Piccot, A.R., 1949, *Residual Contamination Survey at Joslyn Steel Company*, memorandum to file, Health and Safety Laboratory, U.S. Atomic Energy Commission, August 22.

RSSI (Radiation Safety Services, Inc.), 2004, *Report of a Focused Radiological Survey at Slater Steels Corporation*, *Fort Wayne*, *Indiana*, *Facility*, prepared by RSSI, Morton Grove, Illinois, for Valbruna Slater Steel Corporation, Oakland, New Jersey, March 24.

SAIC (Science Applications International Corporation), 2005, *Fort Wayne Steel Corporation*, *North-South Bay Radiological Survey and Exposure Assessment*, prepared for Fort Wayne Steel Corporation, Fort Wayne, Indiana, March.

Thornton, W.T., 1977, *ERDA Resurvey Program: Joslyn Stainless Steel Company*, *Fort Wayne*, *Indiana*, memorandum from William T. Thornton (Health Protection Branch, Safety and Environmental Control Division, U.S. Energy Research and Development Administration, Oak Ridge Operations) to R.H. Kennedy (Assistant Director for Health Protection, DSSC-HQ, U.S. Energy Research and Development Administration), March 10.

ATTACHMENT 1:

LIST OF JOSLYN MANUFACTURING SITE PROJECT RECORDS

DOC NUM	TYPE	ORG	TITLE	AUTHOR	DATE PUB
JOS-0001	REP	AEC	Monthly Status and Progress Report for April 1948	Kelly	5-May-48
JOS-0002	REP	DOE	Preliminary Survey of Joslyn Stainless Steel Company, Fort Wayne, IN	ORNL	1-Mar-80
JOS-0003	LET	DOE	To Joseph M. Fallon from James J. Fiore regarding Slater Steels Corporation (the former Joslyn Manufacturing and Supply Company), Fort Wayne, IN	Fiore	13-Oct-87
JOS-0004	LET	GE	To Carleton Shrug, Manager, Office of Hanford Directed Operations, Atomic Energy Commission, from A.B. Greninger, Technical Superintendent. Subject: Alpha-Rolled Uranium	Greninger	6-Feb-48
JOS-0005	LET	AERO	To Andrew Wallo III, NE-23, U.S. Department of Energy, from Susan Jones, The Aerospace Corporation. Subject: Final Elimination Reports and Site Summaries	Jones	28-Jul-87
JOS-0006	REP	AEC	To the Files from A.R. Piccot, Residual Contamination Survey at Joslyn Steel Company	Piccot	22-Aug-49
JOS-0007	MEM	ERDA	To R.H. Kennedy, Assistant Director for Health Protection, ERDA, from William T. Thornton, Safety and Environmental Control Division, ERDA ORO, ERDA Resurvey Program: Joslyn Stainless Steel Company, Fort Wayne, IN	Thornton	10-Mar-77
JOS-0008	LET	DOE	To Andrew Wallo III, Environmental Controls and Analysis Directorate, The Aerospace Corporation, from Joseph M. Fallon, Director of Manufacturing, Joslyn Stainless Steels	Fallon	9-Oct-79
JOS-0009	MEM	DOE	To R.C. Muir, General Manager, General Electric Company, Hanford Works, from Howard R. Freitag, Chief, Administrative and SF Accountability Branch. Subject: Shipment of Uranium Metal	Freitag	25-Jun-48
JOS-0010	MEM	DOE	To J.C. Stearns from Methods and Materials Section	Creutz/Gurinsky	7-Nov-44
JOS-0011	LET	DOE	To E.P. Lee, Superintendent, P Division, General Electric Company, Hanford Works, from Howard R. Freitag, Chief, Admininstrative and SF Accountability Branch. Subject: Shipment of Uranium Rods	Freitag	31-Jul-50
JOS-0012	MEM	DOE	To Donald G. Sturges, Chief, Operations Division, Hanford Operations, from F.G. Stroke, Division of Technical Advisers, New York. Subject: Hot Rolling of Uranium Rods	Stroke	5-Sep-51
JOS-0013	REP	AEC	Untitled document concerning Joslyn Manufacturing & Supply Company, Air Dust Sampling	Hallden	8-Nov-51
JOS-0014	MEM	DOE	To S.R. Gaarder, Chicago Operations Office, from R.J. Smith, Chief, Operations Branch, Production Division, New York. Subject: Request for Information	Smith	2-Nov-51

DOC NUM	TYPE	ORG	TITLE	AUTHOR	DATE PUB
JOS-0015	MEM	AEC	To J. Fistero, Jr., MCW from Kelly, U.S. Atomic Energy Commission	Kelly	28-Dec-49
JOS-0016	MEM	AEC	To John Chipman from A.B. Greninger. Subject: Hot Rolling of Metal at Joslyn Manufacturing and Supply Company, Fort Wayne, IN	Greninger	3-Jul-43
JOS-0017	MEM	AEC	To S.K. Allison from A.B. Greninger, Section Chief. Subject: Hot Rolling of Metal	Greninger	25-Mar-44
JOS-0018	MEM	AEC	To A.B. Greninger, Section Chief, Technical Division from J.M. Simmons. Subject: Centerless Grinding Operations at Joslyn Manufacturing and Supply Company, Fort Wayne, IN, November 29-December 16, 1943	Simmons	31-Dec-43
JOS-0019	MEM	AEC	To A.B. Greninger from J.M. Simmons. Subject: Centerless Grinding and Experimental Work on Tuballoy at Joslyn Manufacturing & Supply Company, Fort Wayne, IN, January 3-14, 1944	Simmons	26-Jan-44
JOS-0020	MEM	AEC	To J.J. Nickson, Health Group, from A.B. Greninger, Section Chief, Technical Division, Metallurgical Laboratory. Subject: Grinding Operations at Joslyn Manufacturing and Supply Company	Greninger	30-Nov-43
JOS-0021	MEM	AEC	To J.J. Nixon, Health, from Andrew Van Echo and A.B. Greninger, Section Chief, Technical Division, Metallurigical Laboratory	Van Echo	18-Nov-43
JOS-0022	MEM	DOE	To Mr. Greninger from R.S. Stone, M.D. Director, Health Division, Metallurigcal Laboratory, by J.J. Nickson, M.D. Subject: Surface Finishing of Extruded Tuballoy Bars	Stone	1-Sep-43
JOS-0023	MEM	AEC	To A.B. Greninger, Assoc. Section Chief, Technical Division, from A. Van Echo. Subject: Surface Finishing of Extruded Tuballoy Bars	Van Echo	1-Sep-43
JOS-0024	MEM	AEC	To A.B. Greninger from A. Van Echo. Subject: Addition to Report Dated September 7, 1943. Subject: Centerless Grinding of Fourteen Extruded Rods at Joslyn Manufacturing Company	Van Echo	17-Sep-43
JOS-0025	MEM	AEC	To Capt. J.H. McKinley from A.B. Greninger, Director, Metallurgy Division. Subject: Rolling of Tuballoy by Joslyn Manufaturing & Supply Company, Ft. Wayne, IN	Greninger	8-Feb-45
JOS-0026	MEM	AEC	To Colonel E.E. Kirkpatrick, AEC, from C.W. Beeler, Colonel, Corps of Engineers, Acting Manager, AEC. Subject: Costs of Oxide and Uranium Metal Sold to Great Britain	Beeler	14-Jan-47
JOS-0027	MEM	ORO	To the Files from James J. Koenig. Subject: Delay in Fabrication of Special Uranium Rods	Koenig	26-Aug-46
JOS-0028	MEM	AEC	To W.H. Zinn from James F. Schumar, Argonne National Laboratory. Subject: Contract with Joslyn Manufacturing Company (Contract No. 7401-37-9)	Schumar	18-Jul-46
JOS-0029	NOTI	DOE	To A.J. Blaeser, Vice-President, Joslyn Manufacturing & Supply Company, from W.B. Harrell, Business Manager, the University of Chicago. Subject: Notice of Termination of Subcontract	Harrell	29-Jun-46

DOC NUM	TYPE	ORG	TITLE	AUTHOR	DATE PUB
JOS-0030	MEM	AEC	To W.M. Branch from A.B. Greninger, Assoc. Director, Technical Division. Subject: Your Letter of November Concerning Joslyn Manufacturing & Supply Company, Service Subcontract # 7401-37-9	Greninger	29-Nov-44
JOS-0031	LET	WD	To Captain Rollin D. Morse from F.A. Shinn, Principal Clerk, USED, War Department	Shinn	16-May-44
JOS-0032	LET	AEC	L. Frye, Joslyn Manufacturing and Supply Company, from A.B. Greninger, Section Chief, Metallurgy Section	Greninger	28-Apr-44
JOS-0033	MEM	AEC	To A.B. Greninger from J.M. Simmons. Subject: Cold Drawing of Tuballoy Rods at Joslyn Manufacturing & Supply Compnay, Ft. Wayne, IN, February 23-26, 1944	Simmons	6-Mar-44
JOS-0034	LET	AEC	To C.E. Daniels from A.B. Greninger, Section Chief, Technical Division	Greninger	21-Dec-43
JOS-0035	LET	AEC	To C.E. Daniels from A.B. Greninger, Section Chief, Technical Division	Greninger	11-Jan-44
JOS-0036	MEM	AEC	To R.L. Doan from John Chipman, Section Chief, Technical Division	Chipman	30-Jun-43
JOS-0037	MEM	DOE	To Geraldine Highes, Tonawanda Suboffice, from R.J. Smith, Chief, Miscellaneous Operations Area. Subject: Shipment of Uranium Rods (Bethlehem Rolling-October 1951)	Smith	11-Apr-52
JOS-0038	MEM	DOE	F.W. Malone, Tonawanda Suboffice, from R.J. Smith, Miscellaneous Operations Area. Subject: Uranium Rod, Requisition NAA-SF-11	Smith	23-Jan-52
JOS-0039	LET	AERO	To Andrew Wallo III, NE-23, U.S. Department of Energy, from Susan E. Jones, The Aerospace Corporation. Subject: Eliminaton Reports: National Bureau of Standards, Allied Chemical Company, Joslyn Stainless Steels	Jones	9-Mar-87
JOS-0040	LET	DOE	To E.E. Hodgess, Sr., Vice President Operations, Joslyn Manufacturing Company, from William E. Mott, Acting Director, Environmental Control Technology Division, DOE	Mott	13-Mar-79
JOS-0041	LET	ERDA	To William T. Thornton, Health Protection Branch, Safety and Environmental Control Division, ORNL, from Hal Hollister, Acting Director, Division of Operational and Environmental Safety. Subject: Joslyn Stainless Steel Company, Fort Wayne, IN	Hollister	20-May-77
JOS-0042	CON	ERDA	Contract No. AT-31-1-GEN-281, Supplemental Agreement No. 4, Supplemental Agreement for: Rolling of Additional Uranium Billets	ERDA	28-Sep-48
JOS-0043	REP	RSSI	Report of a Focused Radiological Survey at Slater Steels Corporation Fort Wayne, IN, performed for Fort Wayne Steel Corp., Fort Wayne, IN, by RSSI, 6312 W. Oakton Street, Morton Grove, IL	RSSI	24-Mar-04
JOS-0044	PHOTO	EDR	The EDR Aerial Photo Decade Package, Joslyn Manufacturing Site, 2400 Taylor Street West, Fort Wayne, IN 46802	EDR	24-Feb-05

DOC NUM	TYPE	ORG	TITLE	AUTHOR	DATE PUB
JOS-0045	DIR	EDR	The EDR-City Directory Abstract, Joslyn Manufacturing Site, 2400 Taylor Street West, Fort Wayne, IN 46802	EDR	28-Feb-05
JOS-0046	REP	EDR	The EDR-Industrial Site Package™, Air, Water, OSHA Report, Joslyn Manufacturing Site, 2400 Taylor Street West, Fort Wayne, IN 46802	EDR	25-Feb-05
JOS-0047	REP	EDR	The EDR NEPACheck®, Joslyn Manufacturing Site, 2400 Taylor Street West, Fort Wayne, IN 46802	EDR	25-Feb-05
JOS-0048	MAP	EDR	The EDR Radius Map with GeoCheck®, Joslyn Manufacturing Site, 2400 Taylor Street West, Fort Wayne, IN 46802	EDR	25-Feb-05
JOS-0049	MAP	EDR	The Sanborn® Map Report, Joslyn Manufacturing Site, 2400 Taylor Street West, Fort Wayne, IN 46802	EDR	25-Feb-05
JOS-0050	REP	SAIC	Fort Wayne Steel Corporation North-South Bay Radiological Survey and Exposure Assessment	SAIC	17-Mar-05
JOS-0051	LET	DOE	To Major General Carl Strock, U.S. Army Corps of Engineers, from Mark A. Gilbertson, Deputy Assistant Secretary for Environmental Cleanup and Acceleration, DOE	Gilbertson	26-Aug-04

ATTACHMENT I - References

REFERENCES

1. ORNL report entitled “Preliminary Survey of Joslyn Stainless Steel Co. Fort Wayne, Indiana”, dated March 1980
2. Purdue University Cooperative Extension Service, J.R. Frankenberger, February 2002.
3. Environmental Data Resources (EDR) report titled “The EDR-Historical Topographic Map Report” dated February 28, 2005
4. Environmental Data Resources (EDR) report titled “EDR NEPA Check” dated February 24, 2005
5. Environmental Data Resources (EDR) report titled “The EDR-Radius Map” dated February 24, 2005
6. Environmental Data Resources (EDR) report titled “The EDR-City Directory” dated February 28, 2005
7. Environmental Data Resources (EDR) report titled “The EDR-Industrial Site Package Air, Water, OSHA Report” dated February 25, 2005
8. Report of a Focused Radiological Survey at Slater Steels Corporation, March 24, 2004
9. North-South Bay Radiological Survey and Assessment at Fort Wayne Steel Corp., March, 2005
10. United States Environmental Protection Agency (USEPA), 1991. Guidance for Performing Preliminary Assessments Under CERCLA. September 1991.
11. NUREG –1757, Consolidated NMSS Decommissioning Guidance, U.S. Nuclear Regulatory Commission, September, 2002